



## 47 CFR PART 22H & 24E

# TEST REPORT

Issued to

Brightstar Corp. 9725 NW 117th Ave, #300 - Doral - FL - 33178

GSM 850/1900 Cell phone

Model Name:

Avvio 251

Trade Name:

Brightstar

Brand Name:

Avvio

FCC ID:

WVBAVVIO251

Test Rule:

47 CFR Part 2

47 CFR Part 22 Subpart H

47 CFR Part 24 Subpart E

Test date:

February 21, 2011 - March 16, 2011

Shenzhen Morlab Communications Technology Co., Ltd.

Review by Huang Pulong

2011.3.24

Authorized Test Lab









Reg. No. 741109

電訊管理局

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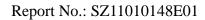




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	Change History						
Issue	Date	Reason for change					
1.0	February 23, 2011	First edition					



## 1. GENERAL INFORMATION

## 1.1 EUT Description

Hardware Version .....: N/A Software Version .....: N/A

Applicant .....: Brightstar Corp.

9725 NW 117<sup>th</sup> Ave, #300 – Doral – FL – 33178

Manufacturer ...... MobilMAX Technology Inc.

2F-5 No. 28 Tai Yuan St., Chupei City, Hsinchu County 302,

Taiwan

Frequency Range ...... GSM 850MHz:

Tx: 824.20 - 848.80MHz (at intervals of 200kHz); Rx: 869.20 - 893.80MHz (at intervals of 200kHz)

GSM 1900MHz:

Tx: 1850.20 - 1909.80MHz (at intervals of 200kHz); Rx: 1930.20 - 1989.80MHz (at intervals of 200kHz)

Modulation Type.....: GMSK
Emission Designators ....: 300KGXW
Power Supply .....: Battery

Model Name: BL-5C 523450AR

Brand name: N/A
Capacitance: 600mAh
Rated voltage: 3.7V

Manufacturer: SHENZHEN CHOLIPOWER TECHNOLOGY

CO.,LTD

Ancillary Equipments...... AC Adapter (Charger for Battery)

Model Name: X110 Brand Name: N/A

Serial No.: (n.a. marked #1 by test site)
Rated Input: ~ 100-300V, 50- 60Hz, 300mA

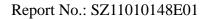
Rated Output: =  $5.3V\pm0.3V$ , 500mA

Note 1: The transmitter (Tx) frequency arrangement of the Cellular 850MHz band used by the EUT can be represented with the formula F(n)=824.2+0.2\*(n-128), 128<=n<=251; the lowest, middle, highest channel numbers (ARFCHs) used and tested in this report are separately 128 (824.2MHz), 190 (836.6MHz) and 251 (848.8MHz).

Note 2: The transmitter (Tx) frequency arrangement of the PCS 1900MHz band used by the EUT can be represented with the formula F(n)=1850.2+0.2\*(n-512), 512 <= n <= 810; the lowest,



Note 3:	middle and highest channel numbers (ARFCHs) used and tested in this report are separately 512 (1850.2MHz), 661 (1880.0MHz) and 810 (1909.8MHz).  For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.							





# 1.2 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 2, Part 22 and Part 24 for the EUT FCC ID Certification:

No.	Identity	Document Title
1	47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General
	(10-1-09 Edition)	Rules and Regulations
2	47 CFR Part 22	Public Mobile Services
	(10-1-09 Edition)	
3	47 CFR Part 24	Personal Communications Services
	(10-1-09 Edition)	

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Result
1	2.1046	Conducted RF Output Power	PASS
2	2.1049	20dB Occupied Bandwidth	PASS
3	2.1055	Frequency Stability	PASS
	22.355		
	24.235		
4	2.1051	Conducted Out of Band Emissions	PASS
	2.1057		
	22.917		
	24.238		
5	2.1051	Band Edge	PASS
	2.1057		
	22.917		
	24.238		
6	22.913	Transmitter Radiated Power (EIPR/ERP)	PASS
	24.232		
7	2.1053	Radiated Out of Band Emissions	PASS
	2.1057		
	22.917		
	24.238		

NOTE: Measurement method according to TIA/EIA-603.



## 1.3 Facilities and Accreditations

#### 1.3.1 Facilities

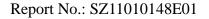
Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L3572.

All measurement facilities used to collect the measurement data are located at 3/F, Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22; the FCC registration number is 741109.

#### 1.3.2 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15 - 35
Relative Humidity (%):	30 -60
Atmospheric Pressure (kPa):	86-106





# 2. 47 CFR PART 2, PART 22H & 24E REQUIREMENTS

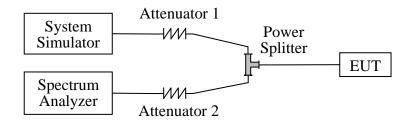
## 2.1 Conducted RF Output Power

## 2.1.1 Requirement

According to FCC section 2.1046(a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in FCC section 2.1033(c)(8).

## 2.1.2 Test Description

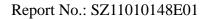
## 1. Test Setup:



The EUT, which is powered by the Battery, is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.

#### 2. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date
System Simulator	Agilent	E5515C	GB43130131	2010.09
Spectrum Analyzer	Agilent	E7405A	US44210471	2010.09
Power Splitter	Weinschel	1506A	NW521	(n.a.)
Attenuator 1	Resnet	20dB	(n.a.)	(n.a.)
Attenuator 2	Resnet	3dB	(n.a.)	(n.a.)





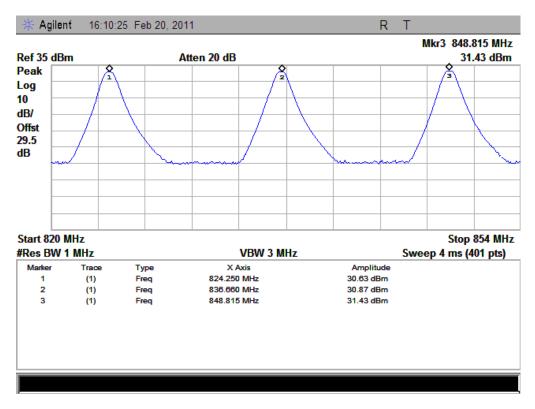
#### 2.1.3 Test Result

Here the lowest, middle and highest channels are selected to perform testing to verify the conducted RF output power of the EUT. For the GSM 850MHz operates at PCL=5 (where Power Class is 4), the rated conducted RF output power is 33dBm, and For the GSM 1900MHz operates at PCL=0 (where Power Class is 1), the rated conducted RF output power is 30dBm.

#### 1. Test Verdict:

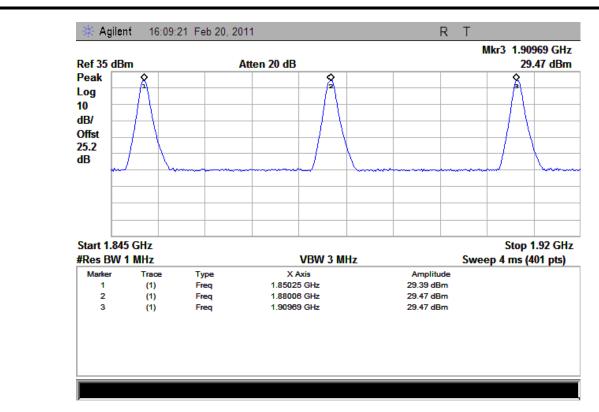
Dand	Channal	Enggueray (MIIa)	Measured Ou	Limit	Verdict	
Band	Channel	Frequency (MHz)	dBm	Refer to Plot	dBm	verdict
CCM	128	824.2	30.63			PASS
GSM 850MHz	190	836.6	30.87	Plot A	35	PASS
650MHZ	251	848.8	31.43			PASS
CCM	512	1850.2	29.39			PASS
GSM	661	1880.0	29.47	Plot B	32	PASS
1900MHz	810	1909.8	29.47			PASS

#### 2. Test Plots:



(Plot A: GSM 850MHz Channel = 128,190,251)





(Plot B: GSM 1900MHz Channel = 512, 661, 810)



# 2.2 99% Occupied Bandwidth

## 2.2.1 Definition

According to FCC section 2.1049, the occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

Occupied bandwidth is also known as the 99% emission bandwidth,.

# 2.2.2 Test Description

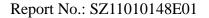
See section 2.1.2 of this report.

## 2.2.3 Test Verdict

Here the lowest, middle and highest channels are tested to record the 99% occupied bandwidth, it's about 255kHz.

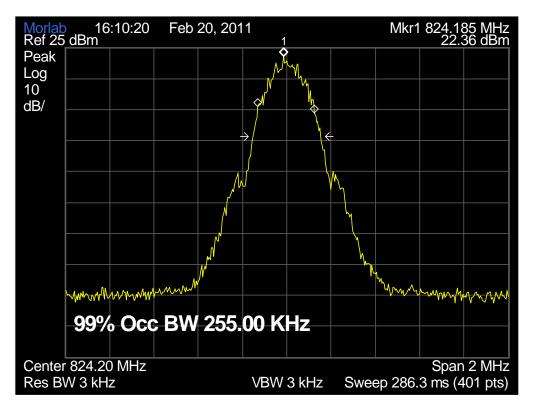
#### 1. Test Verdict:

Band	Channel	Frequency (MHz)	Measured 99% Occupied Bandwidth (kHz)	Refer to Plot
CCM	128	824.2	255.0	Plot A
GSM 850MHz	190	836.6	260.0	Plot B
OJUMITZ	251	848.8	255.0	Plot C
CCM	512	1850.2	260.0	Plot D
GSM 1900MHz	661	1880.0	255.0	Plot E
1900MITZ	810	1909.8	250.0	Plot F

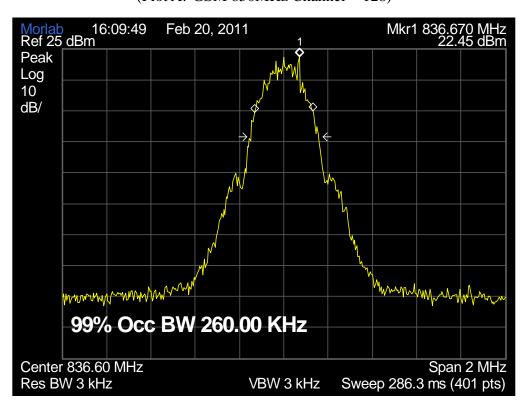




#### 2. Test Plots:

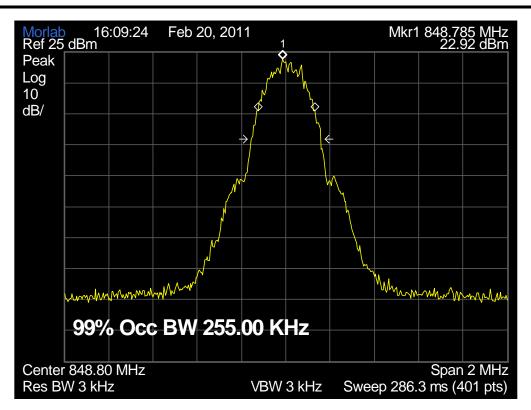


(Plot A: GSM 850MHz Channel = 128)

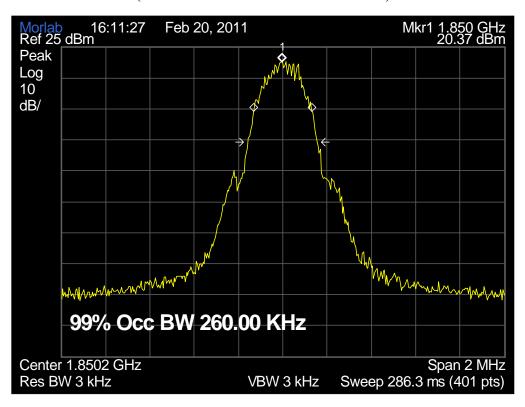


(Plot B: GSM 850MHz Channel = 190)



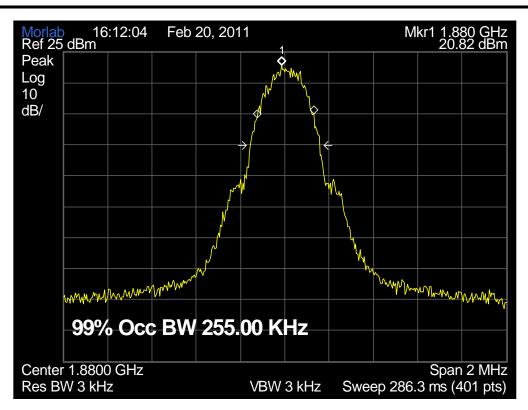


(Plot C: GSM 850MHz Channel = 251)

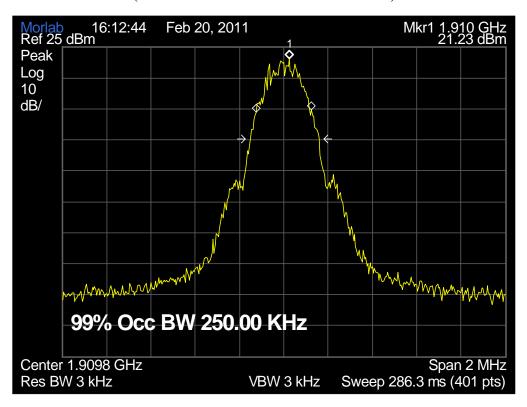


(Plot D: GSM 1900MHz Channel = 512)





(Plot E: GSM 1900MHz Channel = 661)



(Plot F: GSM 1900MHz Channel = 810)



# 2.3 Frequency Stability

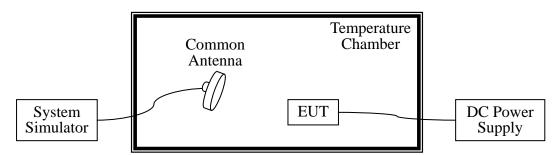
## 2.3.1 Requirement

According to FCC section 22.355 and FCC section 24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. According to FCC section 2.1055, the test conditions are:

- (a) The temperature is varied from  $-30^{\circ}$ C to  $+50^{\circ}$ C at intervals of not more than  $10^{\circ}$ C.
- (b) For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

## 2.3.2 Test Description

## 1. Test Setup:



The EUT, which is powered by the DC Power Supply directly, is located in the Temperature Chamber. The EUT is commanded by the System Simulator (SS) to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS via a Common Antenna.

#### 2. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date
System Simulator	Agilent	E5515C	GB43130131	2010.09
DC Power Supply	Good Will	GPS-3030DD	EF920938	2010.09
Temperature	YinHe Experimental	HL4003T	(n.a.)	2010.09
Chamber	Equip.			

## 2.3.3 Test Verdict

The nominal, highest and lowest extreme voltages are separately 3.7VDC, 4.2VDC and 3.6VDC, which are specified by the applicant; the normal temperature here used is 25°C. The frequency



# deviation limit of GSM 850MHz band is $\pm 2.5 ppm$ , and GSM 1900MHz is $\pm 1 ppm$

	Test C	onditions	Frequency Deviation							
Band	Power	Temperat	Chann	iel = 128	Chann	Channel = 190 Chan		nel = 251	Verdict	
Danu	(VDC)	ure (°C)	(824.	2MHz)	(836.	6MHz)	(848.	.8MHz)	verdict	
	(VDC)	ure ( C)	Hz	Limits	Hz	Limits	Hz	Limits		
		-30	-7.22		3.46		25.06			
		-20	7.29	-0.6	-0.67 31.03		-25.06			
		-10	-1.01				24.03			
		0	-10.13		-23.57		-23.11			
GSM	3.7	+10	-13.99		26.49		9.85			
850MHz		+20	19.42	$\pm 2060.5$	29.46	±2091.5	27.01	±2122	PASS	
830WI1Z		+30	-24.42		-24.07		26.09			
		+40	4.03		-21.34		-8.15			
		+50	-18.21		21.21		27.13			
	4.2	+25	13.04		-24.03		24.37			
	3.6	+25	-11.92		11.08		24.26			
	Test C	onditions	Frequency Deviation							
Band	Power	Temperat	Channel = 512		Chann	el = 661	Channel = 810		Verdict	
Dana	(VDC)	ure (°C)	(1850.2MHz)		(1880.0MHz)		(1909.8MHz)		verturet	
	(VDC)	(VBC)	ure ( c)	Hz	Limits	Hz	Limits	Hz	Limits	
		-30	-16.29		15.76		-7.22			
		-20	29.37		-5.16		27.39			
		-10	-11.06		24.03		-11.01			
		0	35.04		-13.31		-20.13			
GSM	3.7	+10	-12.26		-9.85		-3.99			
1900MHz		+20	35.09	$\pm 1850.2$	-17.01	±1880.0	29.02	±1909.8	PASS	
170011112		+30	26.75		26.09		-24.82			
		+40	-11.08		-28.35		5.93			
		+50	21.44		17.23		-28.01			
	4.2	+25	-7.85		4.37		33.05			
	3.6	+25	25.32		14.26		-12.92			



## 2.4 Conducted Out of Band Emissions

## 2.4.1 Requirement

According to FCC section 22.917(a) and FCC section 24.238(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10\*log(P)dB. This calculated to be -13dBm.

## 2.4.2 Test Description

See section 2.1.2 of this report.

## 2.4.3 Test Result

The measurement frequency range is from 30MHz to the 10<sup>th</sup> harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the out of band emissions.

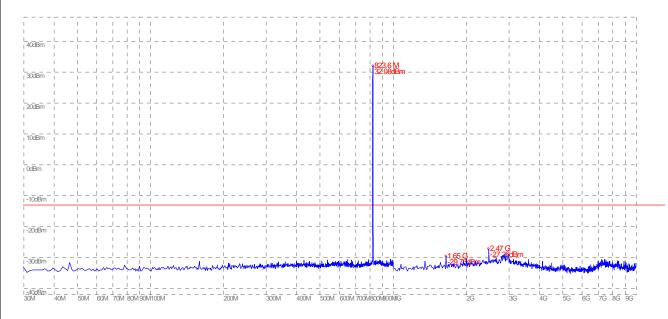
#### 1. Test Verdict:

Band	Channe 1	Frequency (MHz)	Measured Max. Spurious Emission (dBm)	Refer to Plot	Limit (dBm)	Verdic t
CCL	128	824.2	-27.35	Plot A		PASS
GSM 850MHz	190	836.6	-27.15	Plot B	-13	PASS
830MHZ	251	848.8	-26.69	Plot C		PASS
GSM 1900MHz	512	1850.2	-35.29	Plot D		PASS
	661	1880.0	-33.31	Plot E	-13	PASS
1900MITZ	810	1909.8	-36.97	Plot F		PASS

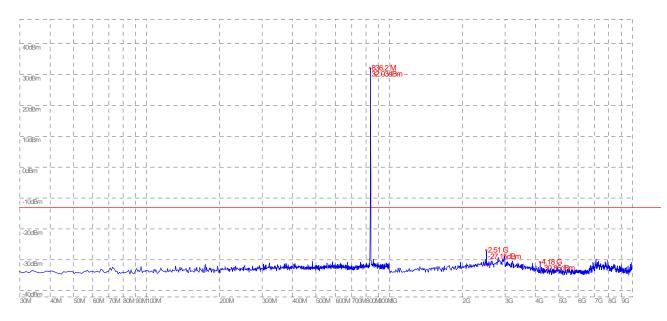


## 2. Test Plots for the Whole Measurement Frequency Range:

Note: the power of the EUT transmitting frequency should be ignored.

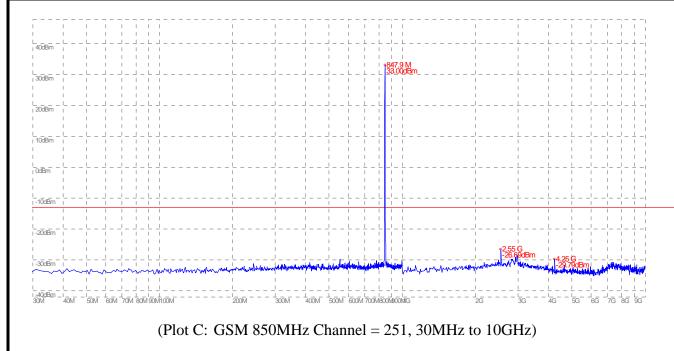


(Plot A: GSM 850MHz Channel = 128, 30MHz to 10GHz)



(Plot B: GSM 850MHz Channel = 190, 30MHz to 10GHz)



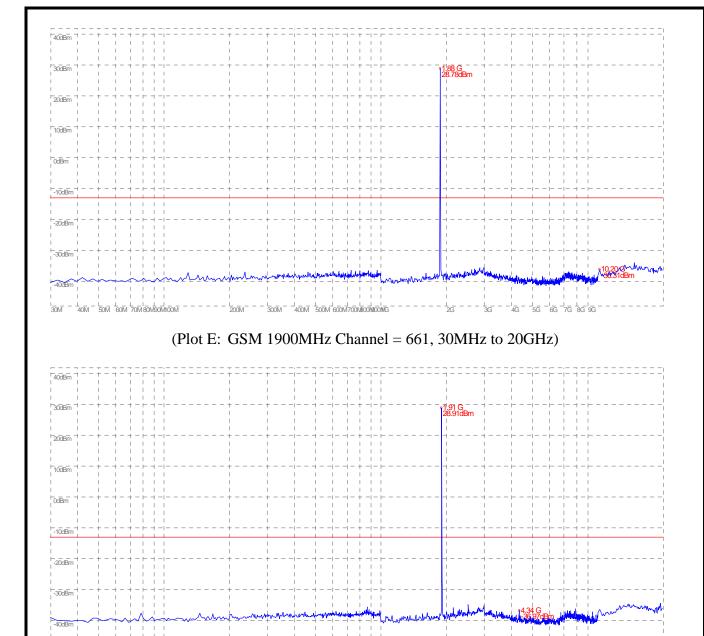




(Plot D: GSM 1900MHz Channel = 512, 30MHz to 20GHz)



30M 40M 50M 60M 70M 80M90M100M



(Plot F: GSM 1900MHz Channel = 810, 30MHz to 20GHz)



# 2.5 Band Edge

## 2.5.1 Requirement

According to FCC section 22.917(b) and FCC section 24.238(b), in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth (26dB emission bandwidth) of the fundamental emission of the transmitter may be employed.

# 2.5.2 Test Description

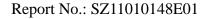
See section 2.1.2 of this report.

## 2.5.3 Test Result

The lowest and highest channels are tested to verify the band edge emissions.

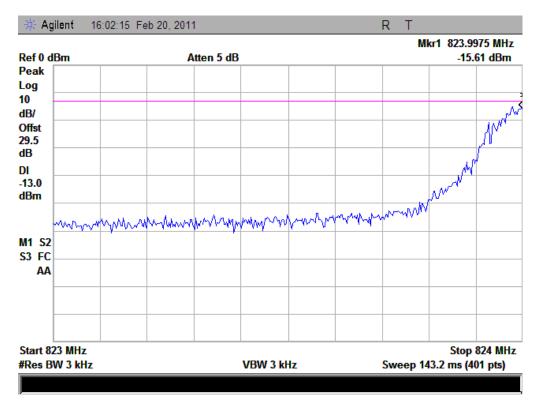
## 1. Test Verdict:

Band	Channel	Frequency (MHz)	Measured Max. Band Edge Emission (dBm)	Refer to Plot	Limit (dBm)	Verdict
GSM	128	824.2	-15.61	Plat A	12	PASS
850MHz	251	848.8	-16.35	Plot B	-13	PASS
GSM	512	1850.2	-17.40	Plat C	-13	PASS
1900MHz	810	1909.8	-18.33	Plot D	-13	PASS

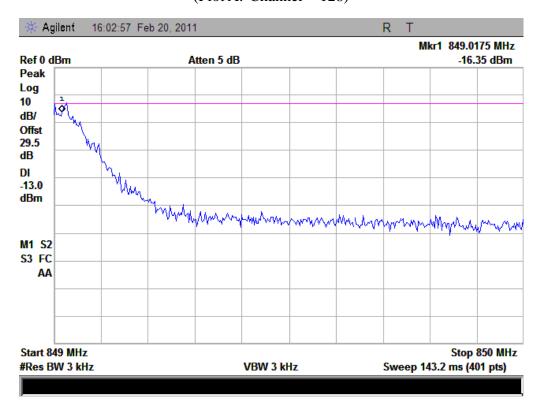




#### 2. Test Plots:

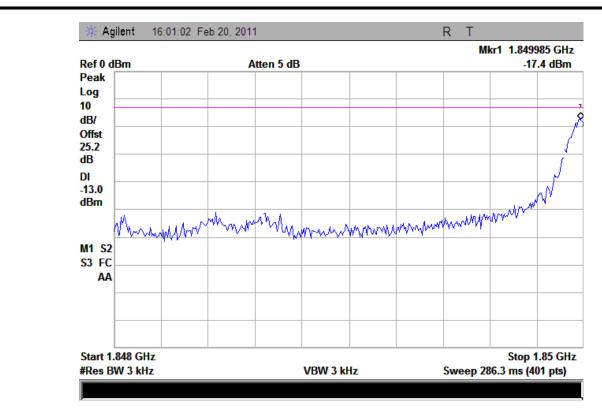


(Plot A: Channel = 128)

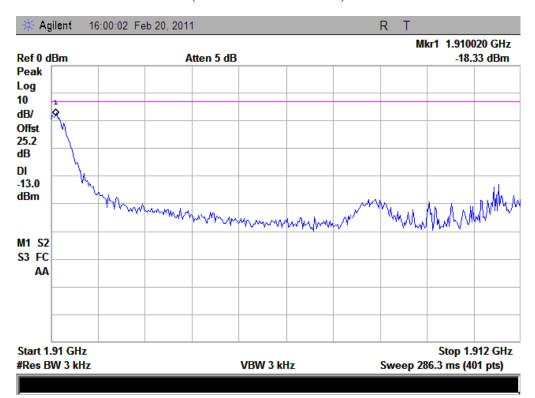


(Plot B: Channel = 251)

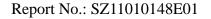




(Plot C: Channel = 512)



(Plot D: Channel = 810)





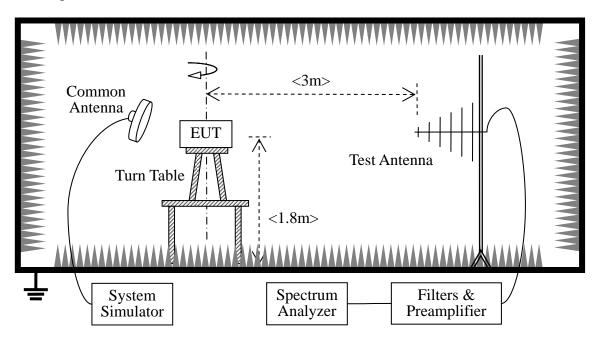
## 2.6 Transmitter Radiated Power (EIRP/ERP)

## 2.6.1 Requirement

According to FCC section 22.913, the Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7Watts, and FCC section 24.232, the broadband PCS mobile station is limited to 2Watts e.i.r.p. peak power.

## 2.6.2 Test Description

#### 1. Test Setup:



The EUT, which is powered by the Battery charged with the AC Adapter, is located in a 3m Full-Anechoic Chamber; the cable loss, air loss and so on of the site as factors are pre-calibrated using the "Substitution" method, and calculated to correct the reading.

A call is established between the EUT and the SS via a Common Antenna. The EUT is commanded by the SS to operate at the maximum and minimum output power (i.e. GSM850MHz band Power Control Level (PCL) = 5/19 and Power Class = 4, GSM1900MHz band Power Control Level (PCL) = 0/15 and Power Class = 1), and only the test result of the maximum output power was recorded.

- -Maximum RF output power: GSM850 30.63dBm, GSM 1900 29.47dBm, Please refer to section 2.1.3 of this report.
- Step size (dB): 3dB
- Minimum RF power: GSM850 6.02dBm, GSM 1900 1.16 dBm



The Test Antenna is a Bi-Log one (used for 30MHz to 1GHz) or a Horn one (used for above 3GHz), and it's located at the same height as the EUT. The Filters consists of Notch Filters and High Pass Filter.

#### 2. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	
System Simulator	Agilent	E5515C	GB43130131	2010.09	
Spectrum Analyzer	Agilent	E7405A	US44210471	2010.09	
Full-Anechoic Chamber	Albatross	9m*6m*6m	(n.a.)	2010.09	
Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	9163-274	2010.09	
Test Antenna - Horn	Schwarzbeck	BBHA 9120C	9120C-384	2010.09	

## 2.6.3 Test Result

The Turn Table is actuated to turn from  $0^{\circ}$  to  $360^{\circ}$ , and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. The lowest, middle and highest channels are tested.

The substitution corrections are obtained as described below:

 $A_{SUBST} = P_{SUBST\_TX} - P_{SUBST\_RX} - L_{SUBST\_CABLES} + G_{SUBST\_TX\_ANT}$ 

 $A_{TOT} = L_{CABLES} + A_{SUBST}$ 

Where A<sub>SUBST</sub> is the final substitution correction including receive antenna gain.

P<sub>SUBST TX</sub> is signal generator level,

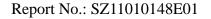
P<sub>SUBST RX</sub> is receiver level,

L<sub>SUBST\_CABLES</sub> is cable losses including TX cable,

G<sub>SUBST\_TX\_ANT</sub> is substitution antenna gain.

A<sub>TOT</sub> is total correction factor including cable loss and substitution correction

During the test, the data of  $A_{TOT}$  was added in the Test Spectrum Analyze, so Spectrum Analyze reading is the final values which contain the data of  $A_{TOT}$ .

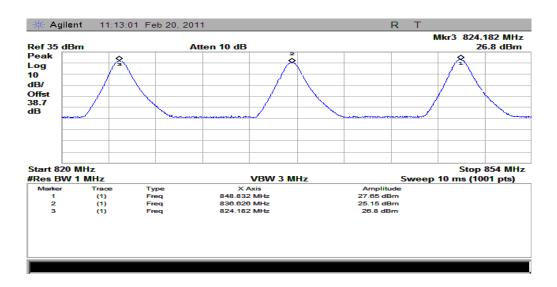




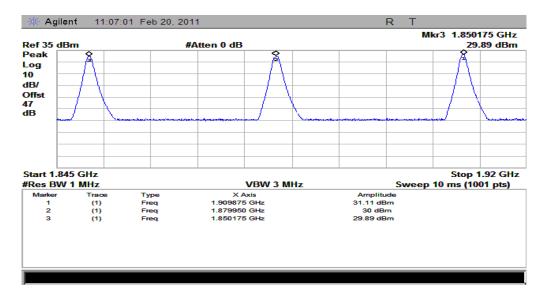
#### 1. Test Verdict:

Band	Channel	Frequency	PCL	Measured ERP/EIRP			Limit		Verdict
		(MHz)		dBm	W	Refer to Plot	dBm	W	verdict
GSM 850MHz	128	824.20	5	27.65	0.58	Plot A	38.45 7		PASS
	190	836.60	5	25.15	0.33			7	PASS
	251	848.80	5	26.80	0.48				PASS
GSM 1900MHz	512	1850.2	0	31.11	1.29	Plot B	33 2	2	PASS
	661	1880.0	0	30.00	1.00				PASS
	810	1909.8	0	29.89	0.97				PASS

## 2. Test Plots:



(Plot A: GSM 850MHz Channel = 128,190,251)



(Plot B: GSM 1900MHz Channel = 512, 661, 810)



## 2.7 Radiated Out of Band Emissions

## 2.7.1 Requirement

According to FCC section 22.917(a) and section 24.238(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10\*log(P)dB. This calculated to be -13dBm.

## 2.7.2 Test Description

See section 2.6.2 of this report.

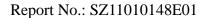
Note: when doing measurements above 1GHz, the EUT has been within the 3dB cone width of the horn antenna during horizontal antenna.

#### 2.7.3 Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. The lowest, middle and highest channels are tested to verify the out of band emissions.

#### 1. Test Verdict:

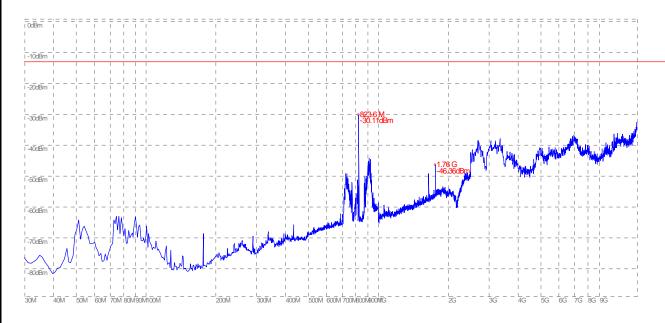
Band	Channe 1	Frequenc y (MHz)		ax. Spurious n (dBm)		Limit (dBm)	Verdict
			Test Antenna	Test Antenna	Refer to Plot		
			Horizontal	Vertical			
GSM 850MHz	128	824.2	-46.36	<-40	Plot A.1/A.2		PASS
	190	836.6	-45.92	-37.20	Plot B.1/B.2	-13	PASS
	251	848.8	-53.34	<-40	Plot C.1/C.2		PASS
GSM 1900MHz	512	1850.2	-34.36	-34.99	Plot D.1/D.2		PASS
	661	1880.0	-30.74	-31.74	Plot E.1/E.2	-13	PASS
	810	1909.8	-25.76	-25.95	Plot F.1/F.2		PASS







Note: the power of the EUT transmitting frequency should be ignored.



(Plot A.1: GSM 850MHz Channel = 128, Test Antenna Horizontal)



(Plot A.2: GSM 850MHz Channel = 128, Test Antenna Vertical)



