

# Variant FCC RF Test Report

APPLICANT : Brightstar Coporation  
EQUIPMENT : Mobile phone  
BRAND NAME : Avvio  
MODEL NAME : Avvio 921  
FCC ID : WVBA921  
STANDARD : FCC 47 CFR Part 2, 22(H), 24(E)  
CLASSIFICATION : PCS Licensed Transmitter Held to Ear (PCE)

This is a variant report which is only valid together with the original test report. The product was received on Jun. 07, 2012 and completely tested on Jul. 17, 2012. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI / TIA / EIA-603-C-2004 and shown compliance with the applicable technical standards.

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

Reviewed by:



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Jones Tsai / Manager



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

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## REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG260403-01	Rev. 01	This is a variant report for Avvio 921. The product equality declaration can be referred to Appendix C. All the test cases were performed in original report which can be referred to Sporton Report Number FG260403. Based on original report, only the Conducted Power, ERP/EIRP and Radiated Spurious Emissions were verified.	Jul. 25, 2012

## SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	§2.1046	N/A	Conducted Output Power	N/A	PASS	-
3.2	§22.913(a)(2)	RSS-132(4.4) SRSP-503(5.1.3)	Effective Radiated Power	< 7 Watts	PASS	-
3.2	§24.232(c)	RSS-133 (6.4) SRSP-510(5.1.2)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
3.3	§2.1053 §22.917(a) §24.238(a)	RSS-132 (4.5.1) RSS-133 (6.5.1)	Field Strength of Spurious Radiation	$< 43 + 10 \log_{10}(P[\text{Watts}])$	PASS	Under limit 15.43 dB at 3345.000 MHz

# 1 General Description

## 1.1 Applicant

Brightstar Coporation

9725 NW 117th Ave., Miami, Florida, United States

## 1.2 Manufacturer

Skycom Telecommunications Co Limited

Room 604, East Block, Shengtang Building, Futian District, Shenzhen, China

## 1.3 Feature of Equipment Under Test

Product Feature	
Equipment	Mobile phone
Brand Name	Avvio
Model Name	Avvio 921
FCC ID	WVBA921
EUT supports Radios application	GSM / Bluetooth
HW Version	X225-MB-V2.1
SW Version	X225_7E_COMCEL_BT_FM_NMI60X_TP_12832_LCD240 X320_V15_120524_1033
EUT Stage	Production Unit

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

Product Specification subjective to this standard	
Tx Frequency	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8MHz
Rx Frequency	GSM850: 869.2 MHz ~ 893.8 MHz GSM1900: 1930.2 MHz ~ 1989.8 MHz
Maximum Output Power to Antenna	GSM850 : 32.29 dBm GSM1900 : 29.76 dBm
Antenna Type	Fixed Internal Antenna
Type of Modulation	GSM / GPRS: GMSK

## 1.4 Maximum ERP/EIRP Power

FCC Rule	System	Type of Modulation	Maximum ERP/EIRP (W)
Part 22	GSM850 GSM	GMSK	0.3639
Part 24	GSM1900 GSM	GMSK	0.7079

## 1.5 Testing Site

<b>Test Site</b>	SPORTON INTERNATIONAL (KUNSHAN) INC.		
<b>Test Site Location</b>	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C. TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958		
<b>Test Site No.</b>	<b>Sporton Site No.</b>		<b>FCC/IC Registration No.</b>
	TH01-KS	03CH01-KS	149928/4086E-1

## 1.6 Applied Standards

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

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

### Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

## 1.7 Ancillary Equipment List

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	DC Power Supply	GWINSTEK	GPS-3030D	N/A	N/A	Unshielded, 1.8 m

## 2 Test Configuration of Equipment Under Test

### 2.1 Test Mode

During all testing, EUT is in link mode with base station emulator at maximum power level. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission.

Frequency range investigated for radiated emission is as follows:

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

Test Modes		
Band	Radiated TCs	Conducted TCs
GSM 850	■ GSM Link + SIM 2	■ GSM Link + SIM 2
GSM 1900	■ GSM Link + SIM 2	■ GSM Link + SIM 2

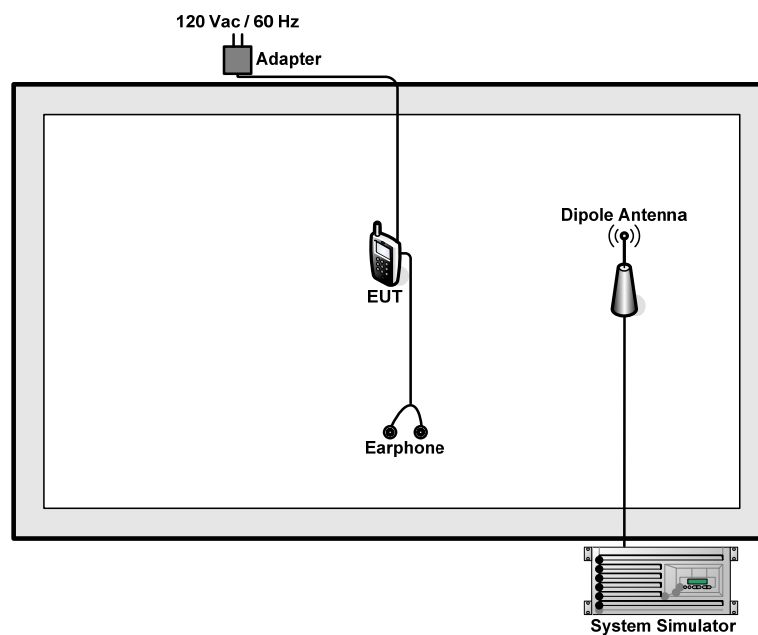
**Note:**

1. The maximum power level is GSM mode for GMSK link, only this mode was used for all tests.
2. Because there are individual antennas for each WWAN and Bluetooth, the co-location test modes are not required.

The conducted power tables are as follows:

Conducted Power (*Unit: dBm)						
Band	GSM850			GSM1900		
Channel	128	189	251	512	661	810
Frequency	824.2	836.4	848.8	1850.2	1880.0	1909.8
GSM	32.22	32.23	32.29	29.75	29.73	29.76
GPRS 8	32.22	32.22	32.28	29.59	29.62	29.65
GPRS 10	31.43	31.33	31.34	28.64	28.65	28.66
GPRS 12	28.31	28.20	28.19	25.67	25.68	25.79

## 2.2 Connection Diagram of Test System





### 3 Test Result

#### 3.1 Conducted Output Power Measurement

##### 3.1.1 Description of the Conducted Output Power Measurement

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

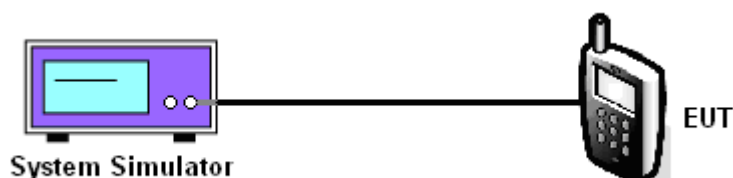
##### 3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

##### 3.1.3 Test Procedures

1. The transmitter output port was connected to base station.
2. Set EUT at maximum power through base station.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Compare each band and different modulation combination to show the worst data rate.

##### 3.1.4 Test Setup



### 3.1.5 Test Result of Conducted Output Power

Cellular Band			
Modes	GSM850 (GSM)		
Channel	128 (Low)	189 (Mid)	251 (High)
Frequency (MHz)	824.2	836.4	848.8
Conducted Power (dBm)	32.22	32.23	32.29
Conducted Power (Watts)	1.67	1.67	1.69

PCS Band			
Modes	GSM1900 (GSM)		
Channel	512 (Low)	661 (Mid)	810 (High)
Frequency (MHz)	1850.2	1880	1909.8
Conducted Power (dBm)	29.75	29.73	29.76
Conducted Power (Watts)	0.94	0.94	0.95

**Note:** maximum burst average power for GSM.

## 3.2 Effective Radiated Power and Effective Isotropic Radiated Power Measurement

### 3.2.1 Description of the ERP/EIRP Measurement

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

### 3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.2.3 Test Procedures

1. The EUT was placed on a turntable with 1.0 meter height in a fully anechoic chamber.
2. The EUT was set at 1.2 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiated power.
4. The height of the receiving antenna is adjusted to look for the maximum ERP/EIRP.
5. Taking the record of maximum ERP/EIRP.
6. A dipole antenna was substituted in place of the EUT and was driven by a signal generator.
7. The conducted power at the terminal of the dipole antenna is measured.
8. Repeat step 3 to step 5 to get the maximum ERP/EIRP of the substitution antenna.
9.  $ERP/EIRP = P_s + E_t - E_s + G_s = P_s + R_t - R_s + G_s$

$P_s$  (dBm) : Input power to substitution antenna.

$G_s$  (dBi or dBd) : Substitution antenna Gain.

$E_t = R_t + AF$

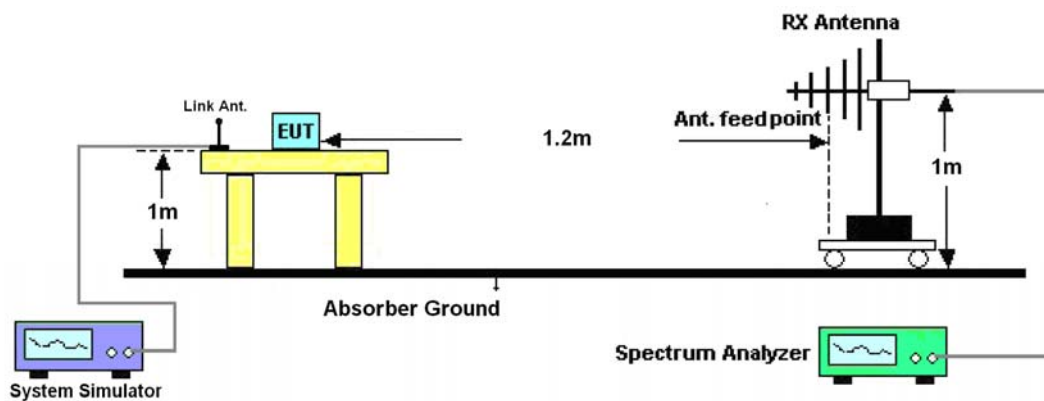
$E_s = R_s + AF$

$AF$  (dB/m) : Receive antenna factor

$R_t$  : The highest received signal in spectrum analyzer for EUT.

$R_s$  : The highest received signal in spectrum analyzer for substitution antenna.

### 3.2.4 Test Setup



### 3.2.5 Test Result of ERP

<b>GSM850 (GSM) Radiated Power ERP</b>						
Horizontal Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBd)	ERP (dBm)	ERP (W)
824.20	-21.57	-48.12	0.00	-1.08	25.47	0.3524
836.40	-22.00	-48.28	0.00	-0.93	25.35	0.3428
848.80	-21.98	-48.35	0.00	-0.76	25.61	0.3639
Vertical Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBd)	ERP (dBm)	ERP (W)
824.20	-33.61	-47.97	0.00	-1.08	13.28	0.0213
836.40	-34.28	-48.01	0.00	-0.93	12.80	0.0191
848.80	-34.39	-48.05	0.00	-0.76	12.90	0.0195

### 3.2.6 Test Result of EIRP

<b>GSM1900 (GSM) Radiated Power EIRP</b>						
Horizontal Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	EIRP (W)
1850.20	-25.54	-51.88	0.00	1.96	28.30	0.6761
1880.00	-26.49	-52.99	0.00	2.00	28.50	0.7079
1909.80	-28.71	-54.28	0.00	1.98	27.55	0.5689
Vertical Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	EIRP (W)
1850.20	-26.37	-52.13	0.00	1.96	27.72	0.5916
1880.00	-27.09	-53.17	0.00	2.00	28.08	0.6427
1909.80	-28.84	-54.13	0.00	1.98	27.27	0.5333

### 3.3 Field Strength of Spurious Radiation Measurement

#### 3.3.1 Description of Field Strength of Spurious Radiated Measurement

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

#### 3.3.2 Measuring Instruments

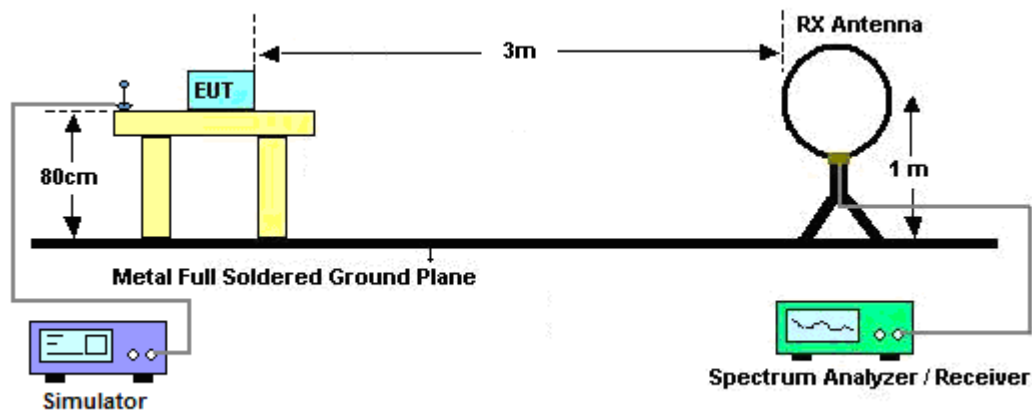
See list of measuring instruments of this test report.

#### 3.3.3 Test Procedures

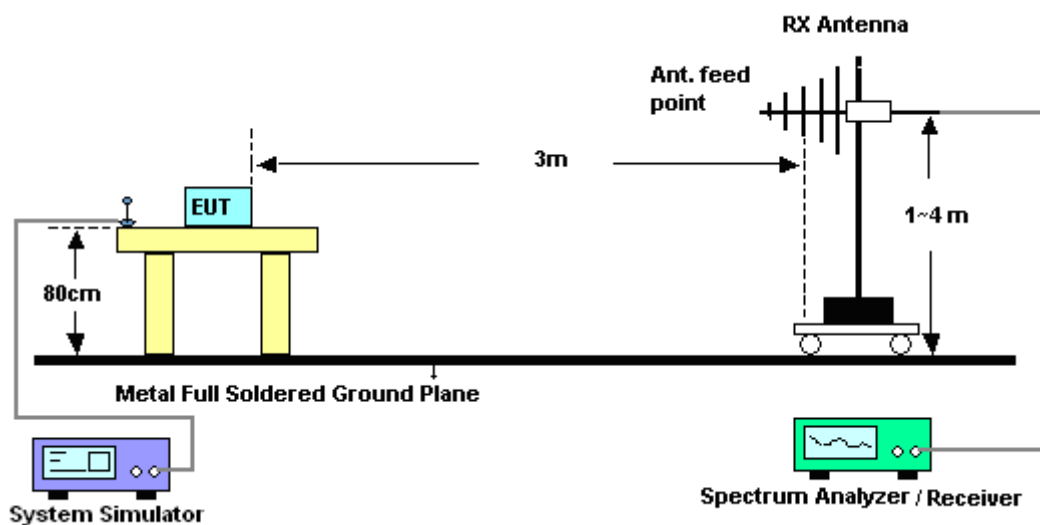
1. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, Sweep = 500ms, Taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10.  $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
11.  $ERP \text{ (dBm)} = EIRP - 2.15$

### 3.3.4 Test Setup

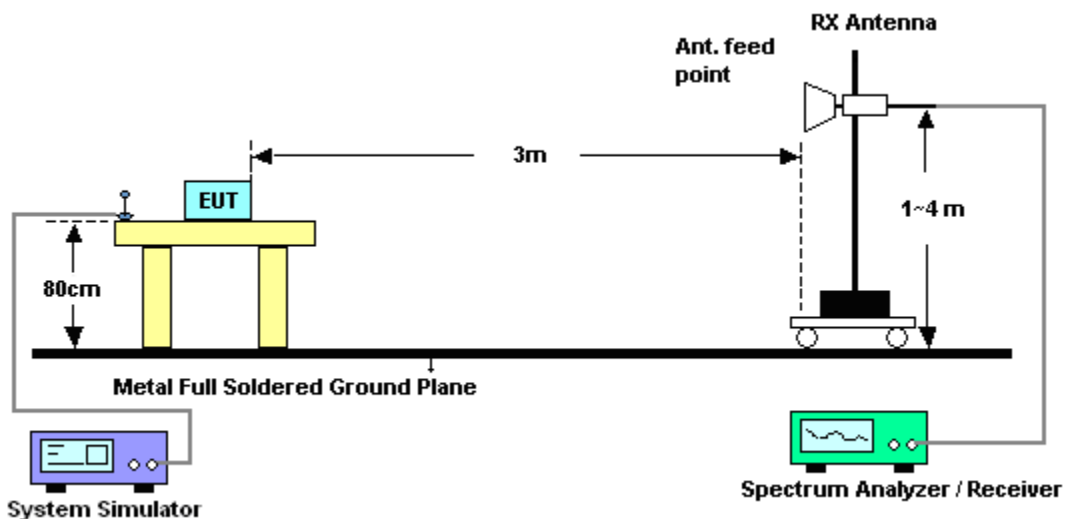
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



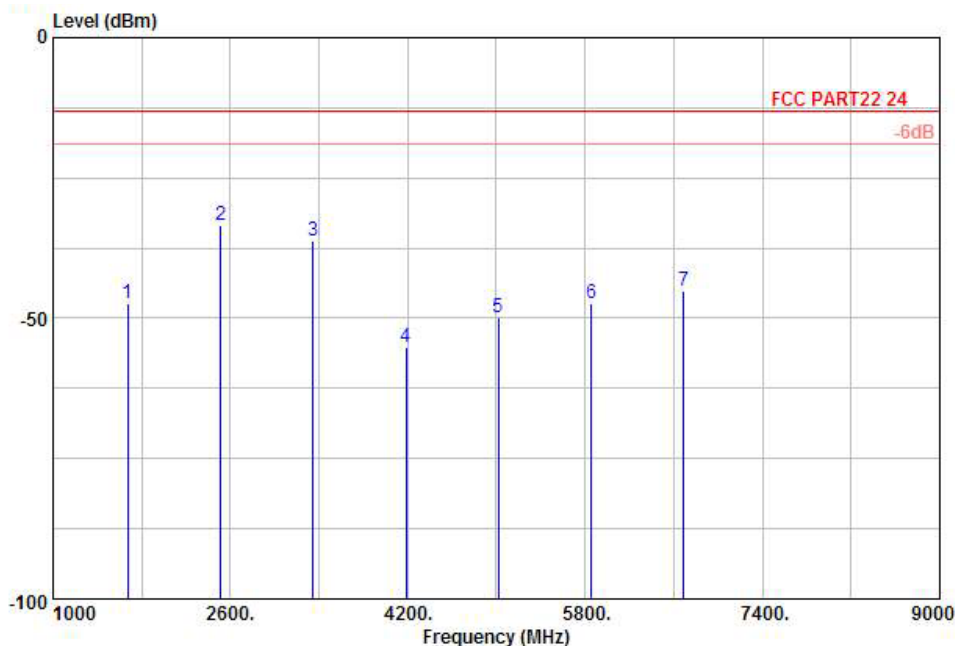
### 3.3.5 Test Results of Radiated Emissions (9 KHz ~ 30 MHz)

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



### 3.3.6 Test Result of Field Strength of Spurious Radiated

<b>Band :</b>	GSM850	<b>Temperature :</b>	21~22°C
<b>Test Mode :</b>	GSM Link	<b>Relative Humidity :</b>	41~42%
<b>Test Engineer :</b>	Steven Hao	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

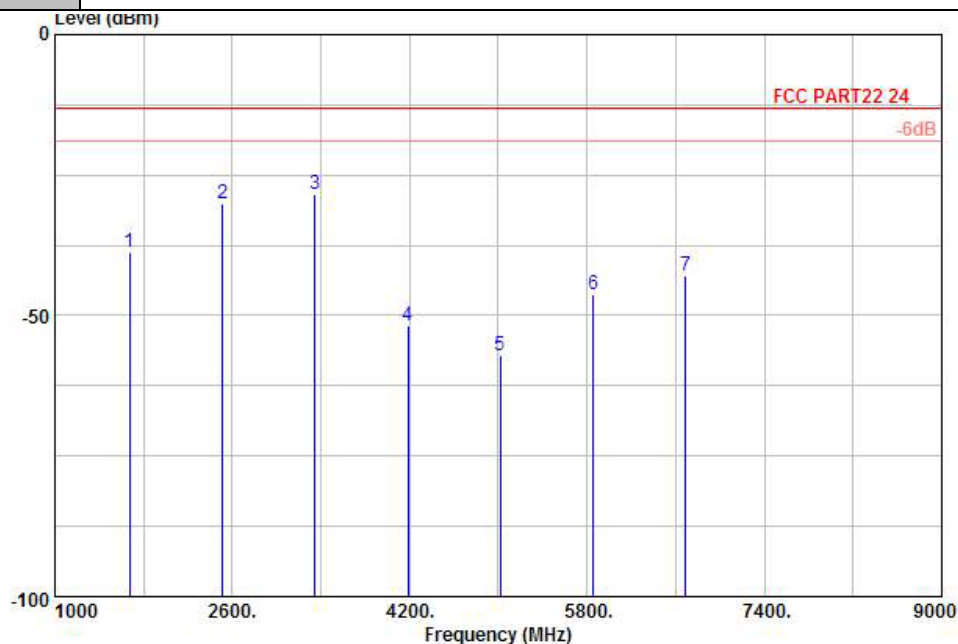


Site : 03CH01-KS  
 Condition: FCC PART22 24 HF EIRP FACTOR-09020 HORIZONTAL  
 EUT : (FG)260403-01  
 Plan : H

Frequency ( MHz )	ERP ( dBm )	Limit ( dBm )	Over Limit ( dB )	SPA Reading ( dBm )	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain ( dBi )	Polarization ( H/V )	Result
1672	-47.23	-13	-34.23	-47.58	-47.96	1.2	4.08	H	Pass
2508	-33.45	-13	-20.45	-39.47	-35.98	1.55	6.23	H	Pass
3345	-36.32	-13	-23.32	-44.39	-39.50	2.1	7.43	H	Pass
4182	-55.08	-13	-42.08	-63.37	-58.51	2.89	8.47	H	Pass
5018	-49.79	-13	-36.79	-62.15	-54.27	3.17	9.80	H	Pass
5854	-47.22	-13	-34.22	-61.93	-52.16	3.12	10.21	H	Pass
6691	-45.00	-13	-32.00	-62.50	-50.58	3	10.73	H	Pass



Band :	GSM850	Temperature :	21~22°C
Test Mode :	GSM Link	Relative Humidity :	41~42%
Test Engineer :	Steven Hao	Polarization :	Vertical
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

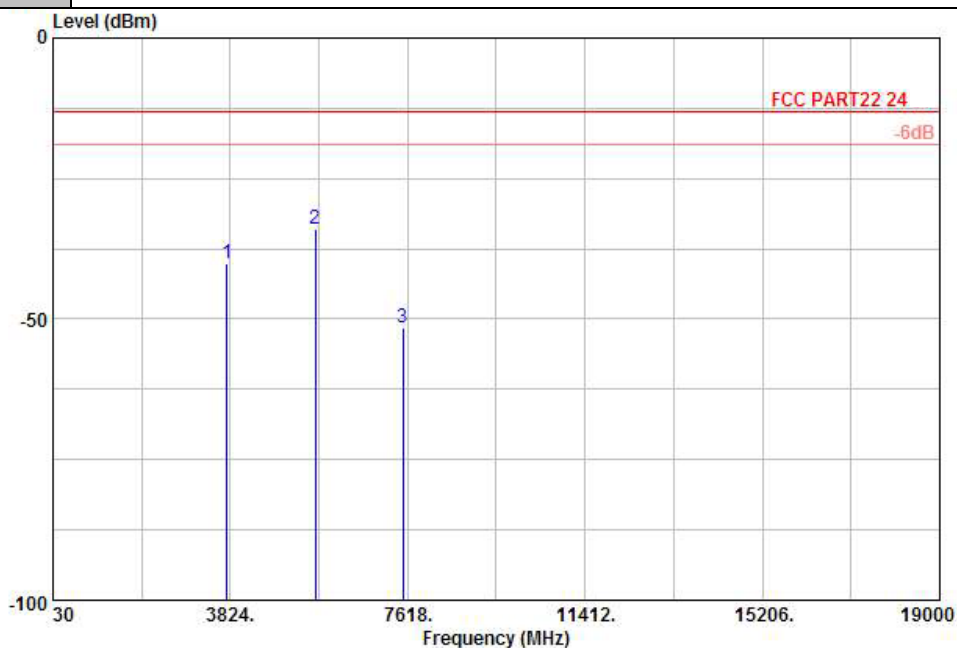


Site : 03CH01-KS  
Condition: FCC PART22 24 HF EIRP FACTOR-09020 VERTICAL  
EUT : (FG)260403-01  
Plan : H

Frequency ( MHz )	ERP ( dBm )	Limit ( dBm )	Over Limit ( dB )	SPA Reading (dBm)	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain (dBi)	Polarization (H/V)	Result
1672	-38.67	-13	-25.67	-40.31	-39.40	1.20	4.08	V	Pass
2509	-29.97	-13	-16.97	-37.45	-32.50	1.55	6.23	V	Pass
3345	-28.43	-13	-15.43	-36.79	-31.61	2.10	7.43	V	Pass
4182	-51.68	-13	-38.68	-58.96	-55.11	2.89	8.47	V	Pass
5018	-56.99	-13	-43.99	-66.01	-61.47	3.17	9.80	V	Pass
5854	-46.15	-13	-33.15	-60.61	-51.09	3.12	10.21	V	Pass
6691	-42.98	-13	-29.98	-59.32	-48.56	3.00	10.73	V	Pass



Band :	GSM1900	Temperature :	21~22°C
Test Mode :	GSM Link	Relative Humidity :	41~42%
Test Engineer :	Steven Hao	Polarization :	Horizontal
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



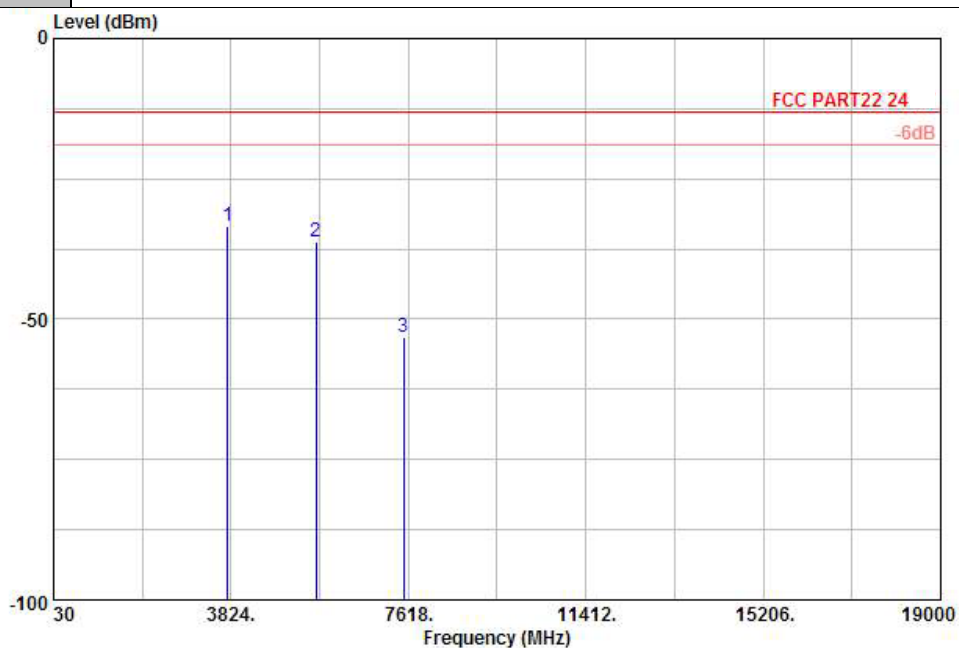
Site : 03CH01-KS  
Condition: FCC PART22 24 HF EIRP FACTOR-09020 HORIZONTAL  
EUT : (FG)260403-01

Plan : H

Frequency ( MHz )	EIRP ( dBm )	Limit ( dBm )	Over Limit ( dB )	SPA Reading ( dBm )	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain ( dBi )	Polarization ( H/V )	Result
3760	-39.98	-13	-26.98	-47.53	-45.38	2.51	7.91	H	Pass
5640	-34.05	-13	-21.05	-52.53	-41.09	3.09	10.13	H	Pass
7520	-51.59	-13	-38.59	-67.47	-60.06	3.11	11.58	H	Pass



Band :	GSM1900	Temperature :	21~22°C
Test Mode :	GSM Link	Relative Humidity :	41~42%
Test Engineer :	Steven Hao	Polarization :	Vertical
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



Site : 03CH01-KS  
Condition: FCC PART22 24 HF EIRP FACTOR-09020 VERTICAL  
EUT : (FG)260403-01

Plan : H

Frequency ( MHz )	EIRP ( dBm )	Limit ( dBm )	Over Limit ( dB )	SPA Reading ( dBm )	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain ( dBi )	Polarization ( H/V )	Result
3760	-33.33	-13	-20.33	-44.09	-38.73	2.51	7.91	V	Pass
5640	-36.13	-13	-23.13	-52.57	-43.17	3.09	10.13	V	Pass
7520	-53.21	-13	-40.21	-68.52	-61.68	3.11	11.58	V	Pass

## 4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
System Simulator	R&S	CMU200	837587/066	2G Full-Band	Dec. 30, 2011	Jul. 16, 2012	Dec. 29, 2012	Conducted (TH01-KS)
DC Power Supply	GWINSTEK	GPS-3030D	E1884515	N/A	Aug. 23, 2011	Jul. 16, 2012	Aug. 22, 2012	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESCI	100534	9kHz~3GHz	Nov. 09, 2011	Jul. 17, 2012	Nov. 08, 2012	Radiation (03CH01-KS)
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Dec. 30, 2011	Jul. 17, 2012	Dec. 29, 2012	Radiation (03CH01-KS)
Bilog Antenna	SCHAFFNER	CBL6112D	23182	25MHz~2GHz	Dec. 08, 2011	Jul. 17, 2012	Dec. 07, 2012	Radiation (03CH01-KS)
Double Ridge Horn Antenna	EMCO	3117	00075959	1GHz~18GHz	Jan. 06, 2012	Jul. 17, 2012	Jan. 05, 2013	Radiation (03CH01-KS)
Amplifier	Wireless	FPA-6592G	060007	30MHz~2GHz	Dec. 30, 2011	Jul. 17, 2012	Dec. 29, 2012	Radiation (03CH01-KS)
Amplifier	Agilent	8449B	3008A02370	1GHz~26.5GHz	Dec. 30, 2011	Jul. 17, 2012	Dec. 29, 2012	Radiation (03CH01-KS)
SHE-EHF Horn	Schwarzbeck	BBHA9170	BBHA170249	15GHz~40GHz	Oct. 11, 2011	Jul. 17, 2012	Oct. 10, 2012	Radiation (03CH01-KS)
Loop Antenna	R&S	HFH2-Z2	860004/00	9kHz~30 MHz	Jul. 28, 2011	Jul. 17, 2012	Jul. 27, 2012	Radiation (03CH01-KS)
System Simulator	R&S	CMU200	116456	Full-Band	Sep. 20, 2011	Jul. 17, 2012	Sep. 19, 2012	Radiation (03CH01-KS)

## 5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	2.54
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### Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.72
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## **Appendix A. Photographs of EUT**

Please refer to Sporton report number EP260403-01 as below.



## **Appendix C. Product Equality Declaration**



# Brightstar Corporation

9725 NW 117th Ave., Miami, Florida, United States, 33178

Tel: 1 305.921-1470 ; Fax: 1 305.863-3367

Date: July 25, 2012

## Product Equality Declaration

We, Brightstar Corporation, declare on our sole responsibility for the product of Avvio 921 below:

The differences between previous and current model of Avvio 921 are as below:

1. Bluetooth part: resistor C501 is change from 0 ohms to 1 ohm

2. RF part:

Part Reference	Previous model of Avvio 921	Current model of Avvio 921
SF600	No	S)FILTER,SAW,EGSM/DCS RX,SFW942PY002,WISOL
C632	No	22pF
C640	No	6pF
C628 C629	No	2pF
L609 L611	No	18nH 4.7nH
C630 C633	No	2.7pF
C623 C627	22pF 10nH	1.0nH 5.6nH

3. SIM part: Current model of Avvio 921 have two SIM slot, while previous have only one SIM slot.

Except listings above, the others are all the same as previous version.

Should you have any questions or comments regarding this matter, please have my best attention.

Sincerely yours,

  
Welton G. Gole