Test Lab
Cert 2951.01

FCC TEST REPORT
(PART 22)

REPORT NO.:	RF130527N048-1
MODEL NO.:	Avvio 360 /Avvio 360S
FCC ID:	WVBA360X
RECEIVED:	May 28, 2013
TESTED:	May 28, 2013 ~ Jun. 9, 2013
ISSUED:	Jun. 10, 2013

APPLICANT:	Brightstar Corporation
ADDRESS:	9725 NW 117th Ave., Miami, Florida, United States

ISSUED BY:	Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch
LAB ADDRESS:	No. 34, Chenwulu Section, Guantai Road, Houjie Town, Dongguan City, Guangdong 523942, China
TEST LOCATION:	No. 34, Chenwulu Section, Guantai Road, Houjie Town, Dongguan City, Guangdong 523942, China

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF130527N048-1	Original release	Jun. 10, 2013

1 CERTIFICATION

PRODUCT:	GSM MOBILE
MODEL:	Avvio 360 /Avvio 360S
BRAND:	Avvio
APPLICANT:	Brightstar Corporation
TESTED:	May 28, 2013 ~ Jun. 9, 2013
TEST SAMPLE:	Production Unit
STANDARDS:	**FCC PART 22, Subpart H**

The above equipment (model: Avvio 360) has been tested by **Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch,** and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

TESTED BY : _____ **, DATE :** Jun. 10, 2013

Kent Liu / Project Engineer

APPROVED BY : _____ **, DATE :** Jun. 10, 2013

Sam Tung / Technical Manager

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 22 & Part 2			
STANDARD SECTION	**TEST TYPE**	**RESULT**	**REMARK**
2.1046 22.913 (a)	Effective Radiated Power	PASS	Meet the requirement of limit.
2.1055 22.355	Frequency Stability	PASS	Meet the requirement of limit.
2.1049	Occupied Bandwidth	PASS	Meet the requirement of limit.
22.917	Band Edge Measurements	PASS	Meet the requirement of limit.
2.1051 22.917	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
2.1053 22.917	Radiated Spurious Emissions	PASS	Meet the requirement of limit.

2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.94dB
Radiated emissions	30MHz ~ 1GHz	3.64dB
	1GHz ~ 18GHz	2.2dB
	18GHz ~ 40GHz	1.94dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2.2 TEST SITE AND INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Spectrum Analyzer	Agilent	E4446A	MY46180622	Apr. 24,13	Apr. 23,14
EMI Test Receiver	Rohde&Schwarz	ESVD	847398/003	May 14,13	May 13,14
Bilog Antenna (25MHz-2GHz)	Teseq	CBL 6111D	27089	Jul. 16,12	Jul. 15,13
Horn Antenna (1GHz -18GHz)	EMCO	3117	00062558	Oct.18,12	Oct.17,13
Pre-Amplifier (20MHz-3GHz)	EMCI	EMC 330	980095	Nov. 02,12	Nov.01,13
Pre-Amplifier (100MHz-26.5GHz)	Agilent	8449B	3008A00409	May 14,13	May 13,14
10m Semi-anechoic Chamber	CHANGLING	21.4m*12.1m*8.8m	NSEMC006	Mar. 24,13	Mar. 23,14
Digital Multimeter	FLUKE	15B	A1220010DG	Oct. 31,12	Oct. 30,13
Horn Antenna (15GHz-40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170242	Jan. 04,12	Jan. 03,14
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Nov. 04,12	Nov. 03,13
Universal Radio Communication Tester	Rohde&Schwarz	CMU 200	123259	Apr. 16,12	Apr. 15,14
Test Software	ADT	ADT_Radiated_V7.6.15	N/A	N/A	N/A

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA and NIM/CHINA.

2. The test was performed in Dongguan Chamber 10m.

3. The horn antenna are used only for the measurement of emission frequency above 1GHz if tested.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	GSM MOBILE
TEST MODEL	Avvio 360
ADDITIONAL MODEL	Avvio 360S
POWER SUPPLY	5.0Vdc (adapter or host equipment) 3.7Vdc (battery)
MODULATION TYPE	**GSM, GPRS:** GMSK
FREQUENCY RANGE	**GSM, GPRS:** 824.2MHz ~ 848.8MHz
MAX. ERP POWER	**GSM:** 0.55Watts
POWER CLASS	5
ANTENNA TYPE	Fixed Internal antenna with antenna gain:0.7dBi
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	USB Cable: Shielded, Detachable, 0.9m; Earphone Cable: Unshielded, Detachable,1m

NOTE:

1. The EUT was powered by the following adapter:

ADAPTER	
BRAND:	N/A
MODEL:	LDB-0500500U
IN PUT:	AC 100-240V, 50/60Hz, 150mA
OUTPUT:	DC 5V, 500mA
DC LINE:	N/A

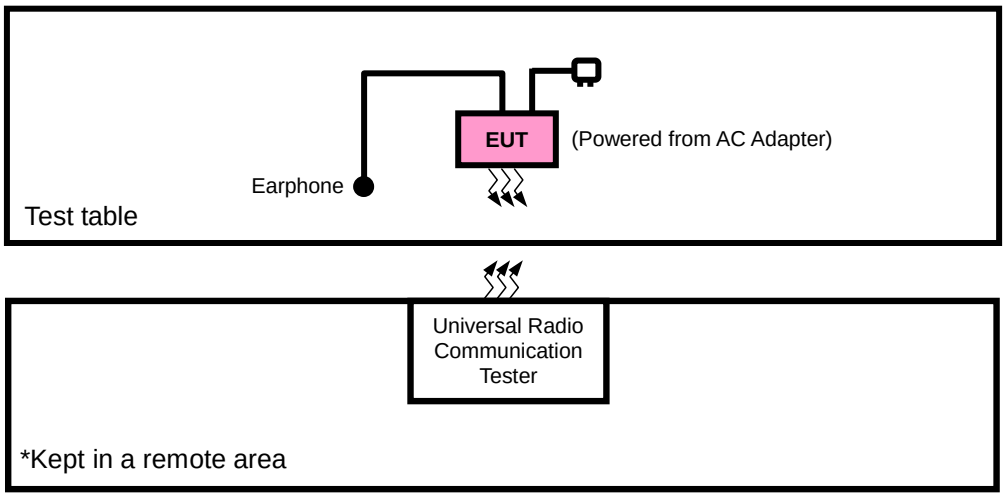
2. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

4. Avvio 360 is single SIM slot and Avvio 360S is Dual SIM slot, but they have same HW except SIM slot.

3.2 CONFIGURATION OF SYSTEM UNDER TEST

FOR RADIATION EMISSION TEST



3.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	DELL	5P2PM2X	12400120329	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1.	AC Line :Unshielded, Detachable,1.5m;DC Line: Unshielded, Undetachable,1.8m;

3.4 TEST ITEM AND TEST CONFIGURATION

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports The worst case was found when positioned X-axis for ERP and for radiated emission. Following modes were selected for the final test as listed below, and the final worst mode is marked in boldface and recorded in the report.

EUT CONFIGURE MODE	DESCRIPTION
A	EUT + Battery 1 + Earphone with GSM link
B	**EUT + Adapter + USB cable+ Earphone with GSM link**
C	EUT + USB cable + Notebook + Earphone with GSM link

GSM MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
B	ERP	128 to 251	128, 190, 251	GSM,
B	FREQUENCY STABILITY	128 to 251	190	GSM,
B	OCCUPIED BANDWIDTH	128 to 251	128, 190, 251	GSM, GPRS,
B	BAND	128 to 251	128, 251	GSM, GPRS,
B	CONDCUDETED EMISSION	128 to 251	128, 190, 251	GSM
A,B,C	RADIATED EMISSION	128 to 251	190	GSM,

TEST CONDITION:

TEST ITEM	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
ERP	22deg. C, 62%RH	3.7Vdc from Battery	Venless Long
FREQUENCY STABILITY	22deg. C, 62%RH	3.7Vdc from Battery	Venless Long
OCCUPIED BANDWIDTH	22deg. C, 62%RH	3.7Vdc from Battery	Venless Long
BAND	22deg. C, 62%RH	3.7Vdc from Battery	Venless Long
CONDCUDETED EMISSION	22deg. C, 62%RH	5Vdc from adapter	Venless Long
RADIATED EMISSION	25deg. C, 60%RH	5Vdc from adapter	Venless Long

3.5 EUT OPERATING CONDITIONS

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

3.6 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2

FCC 47 CFR Part 22

ANSI/TIA/EIA-603-C 2004

NOTE: All test items have been performed and recorded as per the above standards.

4 TEST TYPES AND RESULTS

4.1 OUTPUT POWER MEASUREMENT

4.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

Mobile / Portable station are limited to 7 watts e.r.p.

4.1.2 TEST PROCEDURES

EIRP / ERP MEASUREMENT:

a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 1MHz for GSM, GPRS.

b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.

c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value " of step b. Record the power level of S.G

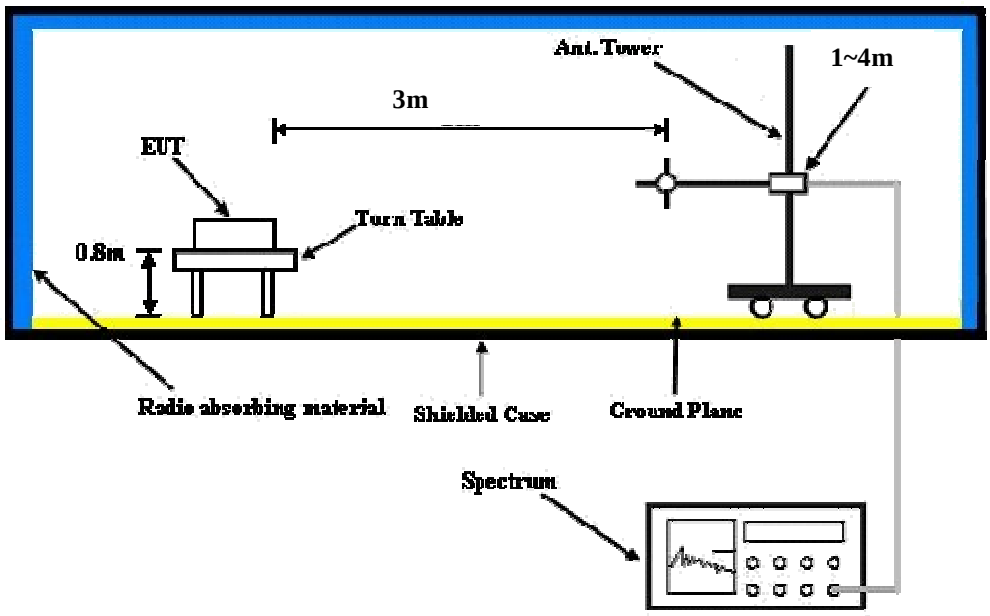
d. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.R.P power - 2.15dBi.

CONDUCTED POWER MEASUREMENT:

The EUT was set up for the maximum power with GSM, GPRS link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

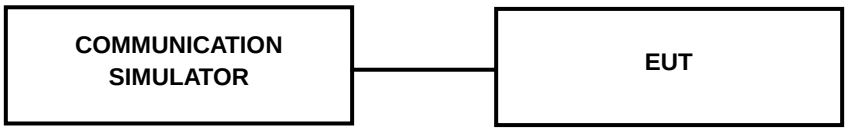
4.1.3 TEST SETUP

EIRP / ERP MEASUREMENT:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

CONDUCTED POWER MEASUREMENT:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.4 TEST RESULTS

CONDUCTED OUTPUT POWER (dBm)

Band	GSM850		
Channel	128	190	251
Frequency (MHz)	824.2	836.4	848.8
GSM	**32.91**	32.86	32.78
GPRS 8	32.87	32.85	32.75
GPRS 10	32.24	32.21	32.01
GPRS 11	30.74	30.63	30.44
GPRS 12	30.04	29.91	29.68

ERP POWER (dBm)

GSM 850 (Horizontal)					
CHANNEL NO.	FREQUENCY (MHz)	SPA Reading (dBm)	CORRECTION FACTOR (dB)	OUTPUT POWER	
				dBm	Watt
128	824.2	-3.58	32.91	27.18	0.52
189	**836.4**	**-4.12**	**33.7**	**27.43**	**0.55**
251	848.8	-4.62	34.14	27.37	0.55
GSM 850 (Vertical)					
CHANNEL NO.	FREQUENCY (MHz)	SPA Reading (dBm)	CORRECTION FACTOR (dB)	OUTPUT POWER	
				dBm	Watt
128	824.2	-12.14	35.18	20.89	0.12
189	836.4	-12.45	35.27	20.67	0.12
251	848.8	-12.86	35.27	20.26	0.11

REMARKS: 1. ERP Output Power (dBm) = SPA Reading (dBm) + Correction Factor (dB) -2.15 (dB)

2. Correction factor (dB) = Free Space Loss + Antenna Factor + Cable Loss.

4.2 FREQUENCY STABILITY MEASUREMENT

4.2.1 LIMITS OF FREQUENCY STABILIITY MEASUREMENT

1.5 ppm is for base and fixed station. 2.5 ppm is for mobile station.

4.2.2 TEST PROCEDURE

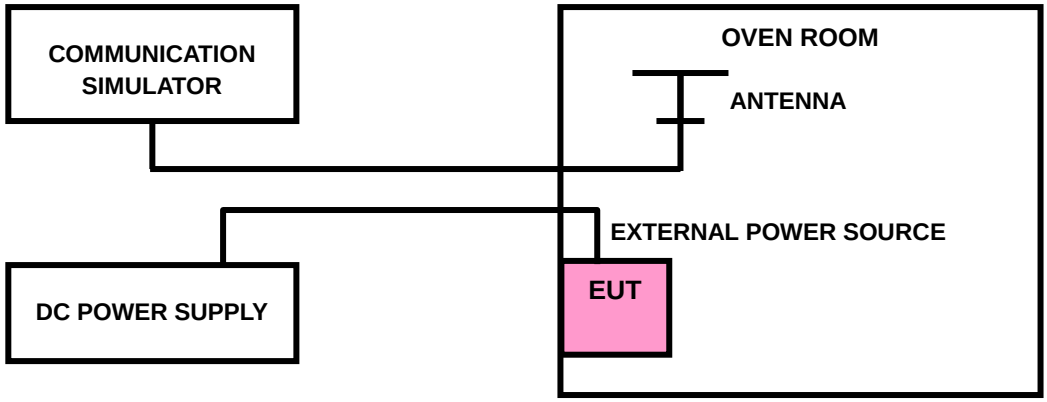
a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.

b. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.

c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5℃ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

NOTE: The frequency error was recorded frequency error from the communication simulator.

4.2.3 TEST SETUP



4.2.4 TEST RESULTS

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	FREQUENCY ERROR (ppm)	LIMIT (ppm)
	GSM	
4.2	-0.01	2.5
3.4	-0.01	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.4Vdc to 4.2Vdc.

FREQUENCY ERROR vs. TEMPERATURE

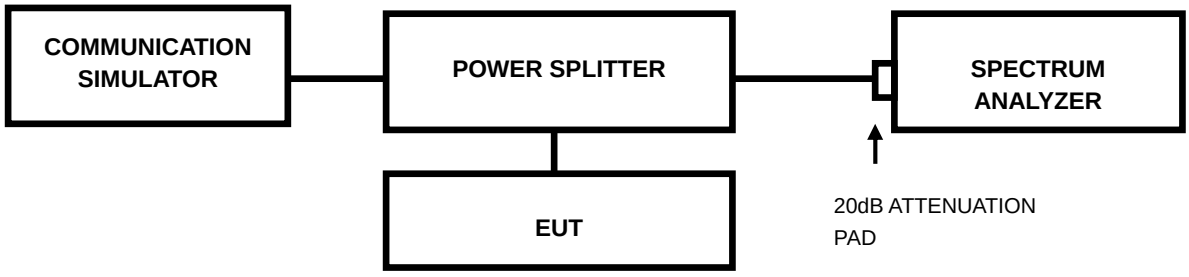
TEMP. (℃)	FREQUENCY ERROR (ppm)	LIMIT (ppm)
	GSM	
50	-0.01	2.5
40	-0.01	2.5
30	-0.01	2.5
20	-0.01	2.5
10	-0.02	2.5
0	-0.01	2.5
-10	-0.01	2.5
-20	-0.02	2.5

4.3 OCCUPIED BANDWIDTH MEASUREMENT

4.3.1 TEST PROCEDURES

The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

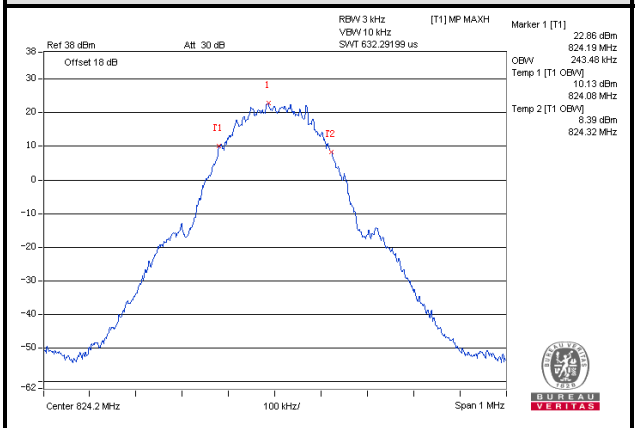
4.3.2 TEST SETUP

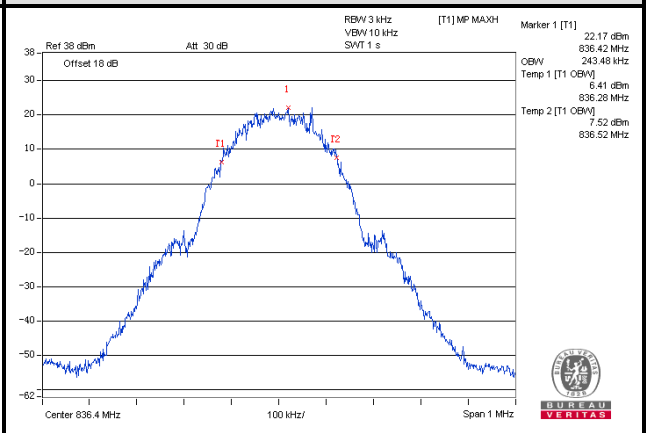


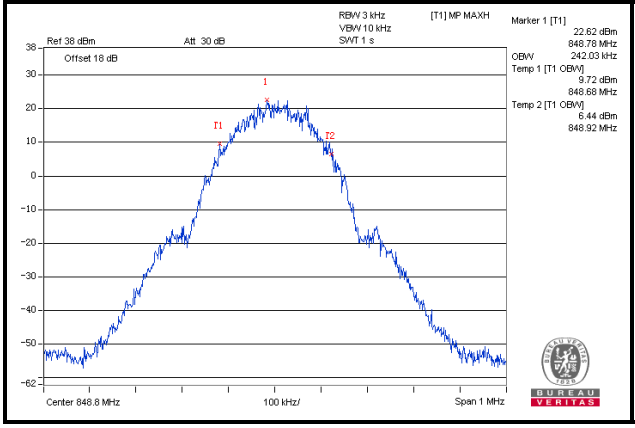
4.3.3 TEST RESULTS

CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (kHz)
		GSM
128	824.2	243.48
190	836.6	243.48
251	848.8	242.03

SPECTRUM PLOT OF GSM VALUE





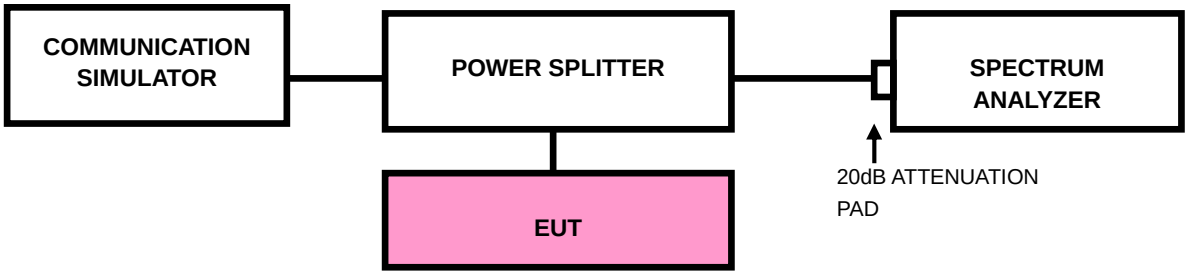


4.4 BAND EDGE MEASUREMENT

4.4.1 LIMITS OF BAND EDGE MEASUREMENT

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. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

4.4.2 TEST SETUP



4.4.3 TEST PROCEDURES

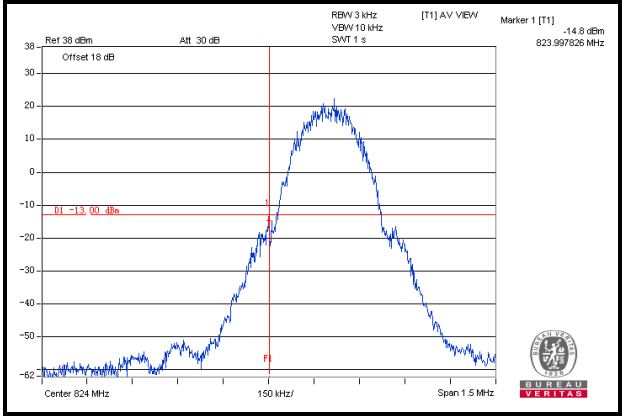
a. All measurements were done at low and high operational frequency range.

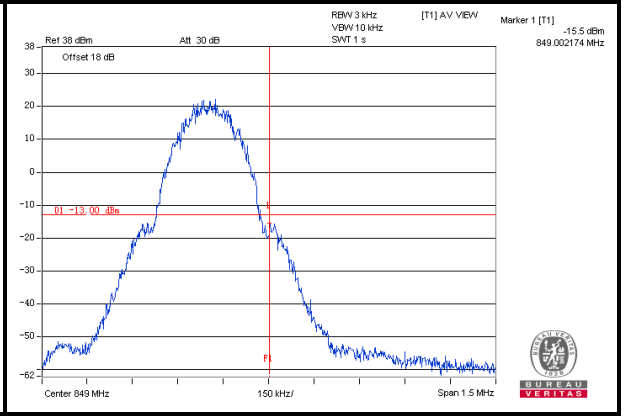
b. The center frequency of spectrum is the band frequency and span is 1.5 MHz. RB of the spectrum is 3kHz and VB of the spectrum is 10kHz (GSM/GPRS).

c. Record the max trace plot into the test report.

4.4.4 TEST RESULTS

GSM			
CHANNEL	128	CHANNEL	251





4.5 CONDUCTED SPURIOUS EMISSIONS

4.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

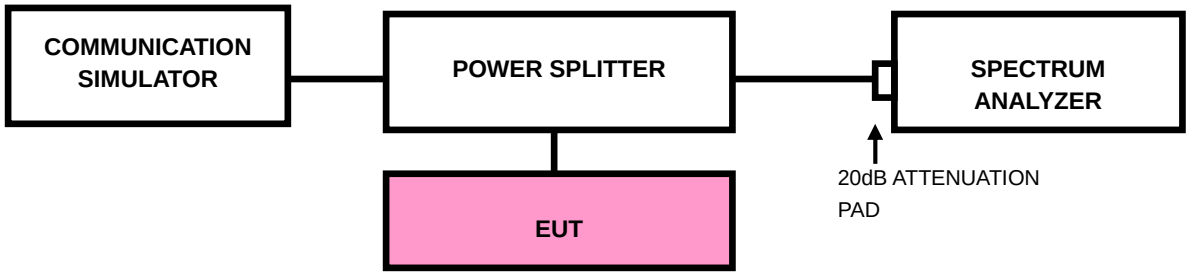
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to –13dBm.

4.5.2 TEST PROCEDURE

a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.

b. Measuring frequency range is from 9 kHz to 9GHz. 20dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

4.5.3 TEST SETUP

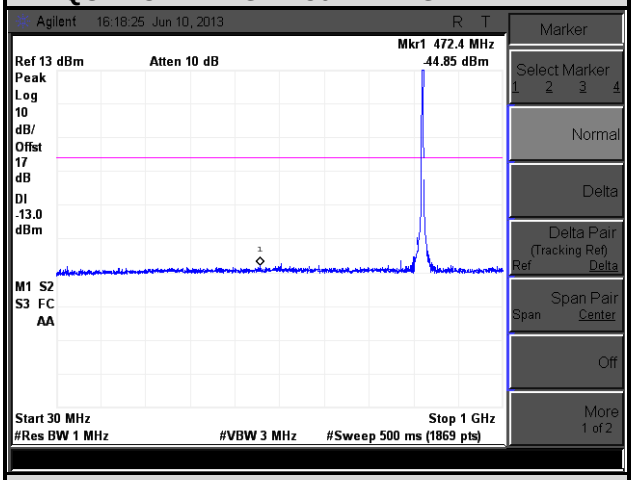


4.5.4 TEST RESULTS

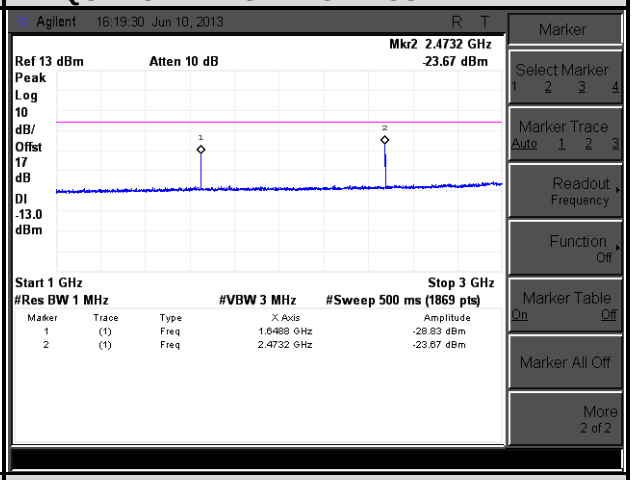
GSM

CHANNEL 128

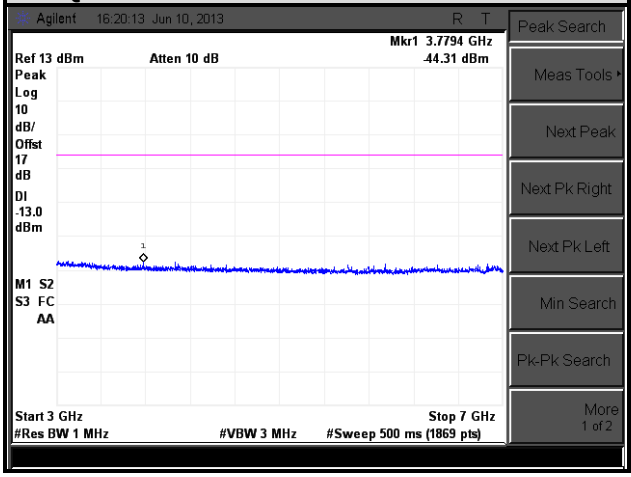
FREQUENCY RANGE : 30MHz~1GHz



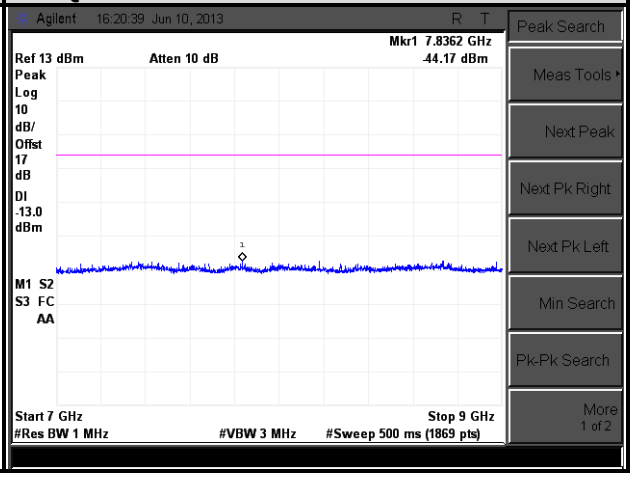
FREQUENCY RANGE : 1GHz~3GHz



FREQUENCY RANGE : 3GHz~7GHz



FREQUENCY RANGE :7GHz~9GHz



4.6 RADIATED EMISSION MEASUREMENT

4.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT

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. The emission limit equal to –13dBm.

4.6.2 TEST PROCEDURES

a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.

b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value " of step a. Record the power level of S.G

c. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.

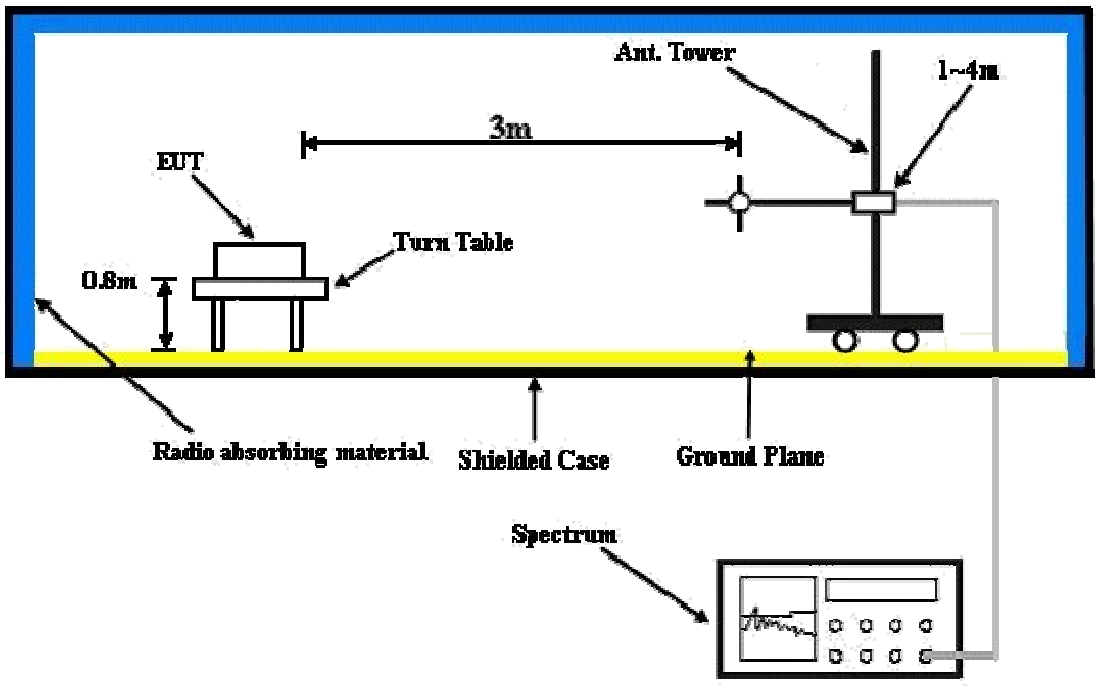
d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power - 2.15dBi.

NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

4.6.3 DEVIATION FROM TEST STANDARD

No deviation

4.6.4 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.6.5 TEST RESULTS

GSM:

FREQUENCY RANGE	Below 1000MHz	INPUT POWER	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	26deg. C, 65%RH	TESTED BY	Venless Long

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBuV)	Limit (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)
1	1672	-44.57	-13	-39.69	0.46	-39.23
2	2509	-48.56	-13	-39.79	0.17	-39.62
3	3345	-52.16	-13	-42.63	1.49	-41.14
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBuV)	Limit (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)
1	1672	-46.34	-13	-38.84	0.46	-38.38
2	2509	-50.75	-13	-40.71	0.17	-40.54
3	3345	-52.64	-13	-40.80	1.49	-39.31

REMARKS:

1. ERP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB) - 2.15 (dB)

5 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).

6 INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch, were founded in 2002 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.

7 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

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