



**Neutron Engineering Inc.**

# FCC Radio Test Report

## FCC ID: QISEM820W

This report concerns (check one) : ☐ Original Grant ☒ Class II Change

**Issued Date** : Apr. 24, 2012  
**Project No.** : 1204C181  
**Equipment** : HSPA+ Module  
**Model Name** : EM820W  
**Applicant** : Huawei Technologies Co., Ltd.  
**Address** : Bantian, Longgang District, Shenzhen China  
**Manufacturer** : Huawei Technologies Co., Ltd.  
**Address** : Administration Building, Huawei Base, Bantian,  
Longgang District , Shenzhen 518129, P.R. China

**Tested by:**

Neutron Engineering Inc. EMC Laboratory

**Date of Receipt:** Apr. 19, 2012

**Date of Test:**

Apr. 19, 2012 ~ Apr. 23, 2012

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### **Declaration**

**Neutron** represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**) of **R.O.C.**, or National Institute of Standards and Technology (**NIST**) of **U.S.A.**

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### **Limitation**

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.



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## **1. CERTIFICATION**

Equipment: HSPA+ Module  
Brand Name: HUAWEI  
Model Name: EM820W  
Applicant: Huawei Technologies Co., Ltd.  
Date of Test: Apr. 19, 2012 ~ Apr. 23, 2012  
Test Item: ENGINEERING SAMPLE  
FCC Part15, Subpart C(15.247) / ANSI C63.4 : 2009  
Standards: FCC CFR47 Part 22 : Subpart H / ANSI C63.4 : 2009  
FCC CFR47 Part 24 : Subpart E / ANSI C63.4 : 2009

The above equipment has been tested and found compliance with the requirement of the relative standards by Neutron Engineering Inc. EMC Laboratory.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. NEI-FCCP-1-1204C181) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of NVLAP and TAF according to the ISO-17025 quality assessment standard and technical standard(s).



## 2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

<b>FCC Part15 (15.247) , Subpart C &amp; Applied Standard: FCC Part 22 &amp; 24</b>				
Standard	Section	Test Item	Judgment	Remark
	15.207	Conducted Emission	PASS	
	15.209	Radiated Emission	PASS	
	2.1053/24.238(a)	Spurious Radiated Emissions	PASS	

**NOTE:**

- (1) "N/A" denotes test is not applicable in this Test Report
- (2) The test item is for co-location



## 2.1 TEST FACILITY

The test facilities used to collect the test data in this report is **DG-C01/DG-CB03** at the location of No.3, Jinshagang 1st Road, ShiXia, Dalang Town, Dong Guan, China.523792  
Neutron's test firm number is 319330

## 2.2 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:

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

### A. Conducted Measurement :

Test Site	Method	Measurement Frequency Range	U , (dB)	NOTE
DG-C01	CISPR	150 KHz ~ 30MHz	1.94	

### B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U , (dB)	NOTE
DG-CB03	CISPR	30MHz ~ 200MHz	V	3.82	
		30MHz ~ 200MHz	H	3.60	
		200MHz ~ 1,000MHz	V	3.86	
		200MHz ~ 1,000MHz	H	3.94	
		1GHz~18GHz	V	3.12	
		1GHz~18GHz	H	3.68	



### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

Equipment	HSPA+ Module	
Brand Name	HUAWEI	
Model Name	EM820W	
OEM Brand/Model Name	N/A	
Model Difference	N/A	
Product Description	The EUT is a HSPA+ Module.	
	Operation Frequency:	824.2~848.8MHz 826.4~846.6MHz 1850.2~1909.8MHz 1852.4~1907.6MHz
	Modulation Technology:	GSMK;8PSK;QPSK
	Number Of Channel:	(Please refer to page 8)
	Antenna Designation:	Please see Note 3.
	Antenna Gain(Peak):	(Please refer to page 8)
	Output Power:	1.8 watts for 824.2~848.8MHz 0.19 watts for 826.4~846.6MHz 0.79 watts for 1850.2~1909.8MHz 0.22 watts for 1852.4~1907.6MHz
	Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.	
	Power Source	3.3V; Supplied by PCIE MINI CARD interface.
Power Rating	DC voltage rang 3.0~3.6V	
Connecting I/O Port(s)	Please refer to the User's Manual	

**Note:**

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.



2.

Band	Channel	Frequency	
		(MHz)	
824.2MHz~848.8MHz (GSM 850)	128	Low	824.2
	190	Mid	836.6
	251	High	848.8
826.4MHz~846.6MHz (WCDMA BAND V)	4132	Low	826.4
	4182	Mid	836.4
	4233	High	846.6
1850.2MHz~1909.8MHz (GSM 1900)	512	Low	1850.2
	661	Mid	1880.0
	810	High	1909.8
1852.4MHz~1907.6MHz (WCDMA BAND II)	9262	Low	1852.4
	9400	Mid	1880.0
	9538	High	1907.6

3. Table for Filed Antenna

Ant.	Antenna Type	Connector	Gain (dBi)	Input Connector	Difference	Note
1	Dipole	UFL	2.15	RP-SMA-Male	With a transmission cable (350mm)	WIFI
2	Dipole	UFL	2.15	RP-SMA-Male	With a transmission cable (140mm)	WIFI
3	Dipole	BTS	4.28	---	---	3G
4	Dipole	BTS	3.00	---	---	3G
5	Dipole	BTS	1.00	---	---	3G(new)
6	Dipole	BTS	2.00	---	---	3G(new)

4. This is to request a Class II permissive change for **FCC ID: QISEM820W**, originally granted on **12/14/2010**.

5. The major change filed under this application is :

**Change #1:** Add one new same type antenna with antenna gain of 1dBi@850MHz and 2dBi @1900MHz. to the original 3G modular

**Change #2:** Alternate a mobile configuration

**Note 1:** The EUT is a HSPA+ Module(Model name: EM820W) which built in the Access Router(Model name: AR1220VW; AR1220W; AR1220W-S) with function of 802.11 b/g/n20/n40. And The access router also granted on 10/26/2011 and bear the FCC ID: QIS-AR1220WIFI.

**Note 2:** The original dipole antenna with gain is 4.28dBi@850MHz and 3dBi@1900MHz. of the 3G modular





### 3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	FULL LOAD

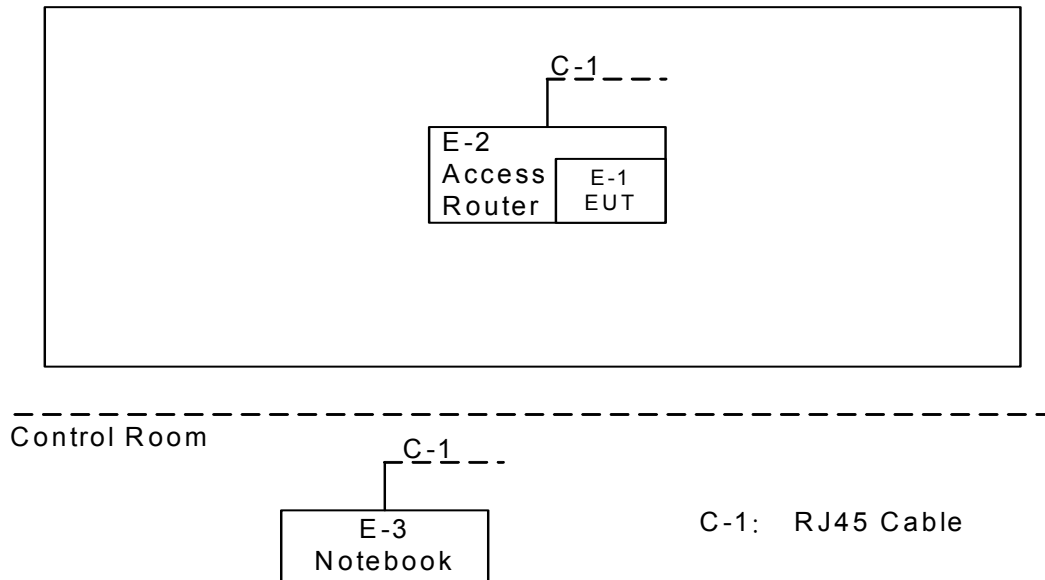
The EUT system operated these modes were found to be the worst case during the pre-scanning test as following:

For Conducted Test	
Final Test Mode	Description
Mode 1	TX WCDMA Band V Channel 4182 11G Channel 6

For Radiated Test	
Final Test Mode	Description
Mode 2	TX WCDMA Band V Channel 4182 11G Channel 6



### 3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



**3.4 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.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
E-1	HSPA+ Module	HUAWEI	EM820W	QISEM820W	N/A	EUT
E-2	Access Router	HUAWEI	AR1220VW	QIS-AR1220WWIFI	N/A	
E-3	NOTEBOOK	DELL	INSPIRON 1420	DOC	JX193A01SD C2	

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	10m	

**Note:**

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in m in 『Length』 column.



#### 4. EMC EMISSION TEST

##### 4.1 CONDUCTED EMISSION MEASUREMENT

##### 4.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	73.00	60.00	56.00	46.00	CISPR
5.0 -30.0	73.00	60.00	60.00	50.00	CISPR

0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	73.00	60.00	56.00	46.00	FCC
5.0 -30.0	73.00	60.00	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

##### 4.1.2 MEASUREMENT INSTRUMENTS LIST AND SETTING

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	LISN	EMCO	3816/2	00052765	May.26.2012
2	LISN	R&S	ENV216	100087	May.26.2012
3	Test Cable	N/A	C_17	N/A	Mar.30.2013
4	EMI TEST RECEIVER	R&S	ESCS30	826547/022	May.26.2012
5	50Ω Terminator	SHX	TF2-3G-A	08122902	May.26.2012

Remark: " N/A " denotes No Model Name. , Serial No. or No Calibration specified.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

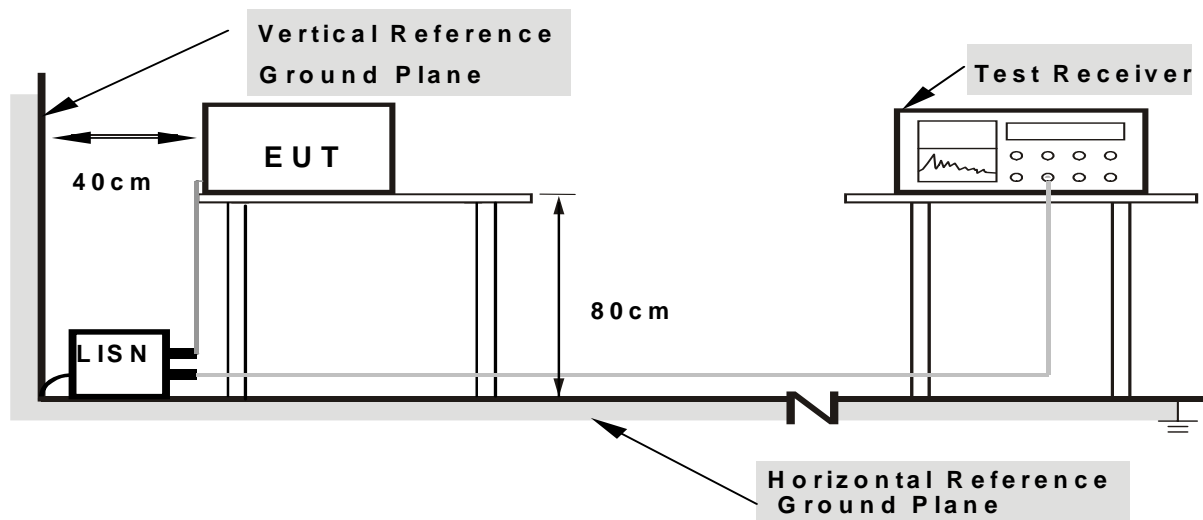
#### 4.1.3 TEST PROCEDURE

- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.1.5 TEST SETUP



**Note: 1.**Support units were connected to second LISN.

**2.**Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

#### 4.1.6 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.



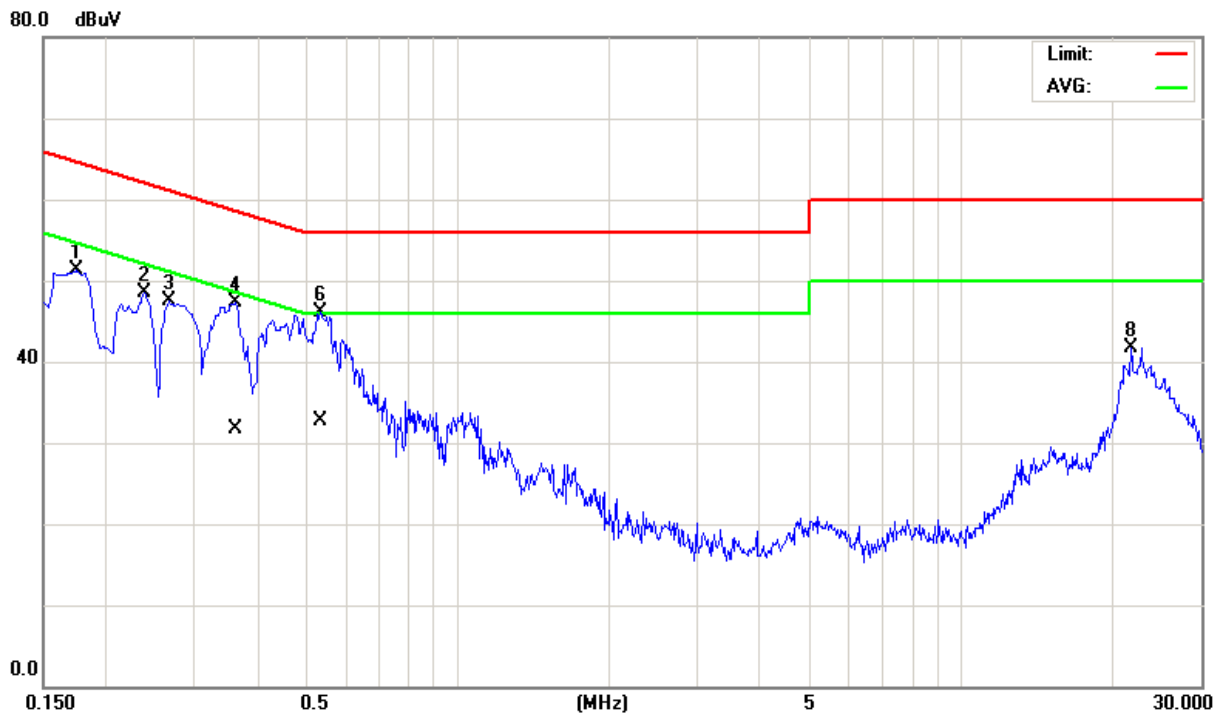
#### 4.1.7 TEST RESULTS

EUT :	HSPA+ Module	Model Name :	EM820W
Temperature :	25 °C	Relative Humidity :	53 %
Pressure :	1010hPa	Test Power :	AC 120V/60Hz
Test Mode :	FULL LOAD		

Freq. (MHz)	Terminal L/N	Measured(dBuV)		Limits(dBuV)		Margin (dB)	Note
		QP-Mode	AV-Mode	QP-Mode	AV-Mode		
0.17	Line	51.22	*	64.77	54.77	-13.55	(QP)
0.24	Line	48.49	*	62.17	52.17	-13.68	(QP)
0.27	Line	47.50	*	61.24	51.24	-13.74	(QP)
0.36	Line	47.34	31.66	58.68	48.68	-11.34	(QP)
0.53	Line	46.10	32.76	56.00	46.00	-9.90	(QP)
21.78	Line	41.73	*	60.00	50.00	-18.27	(QP)

#### Remark

- (1) All readings are QP Mode value unless otherwise stated AVG in column of 'Note'. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform. In this case, a "\*" marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150KHz to 30MHz.



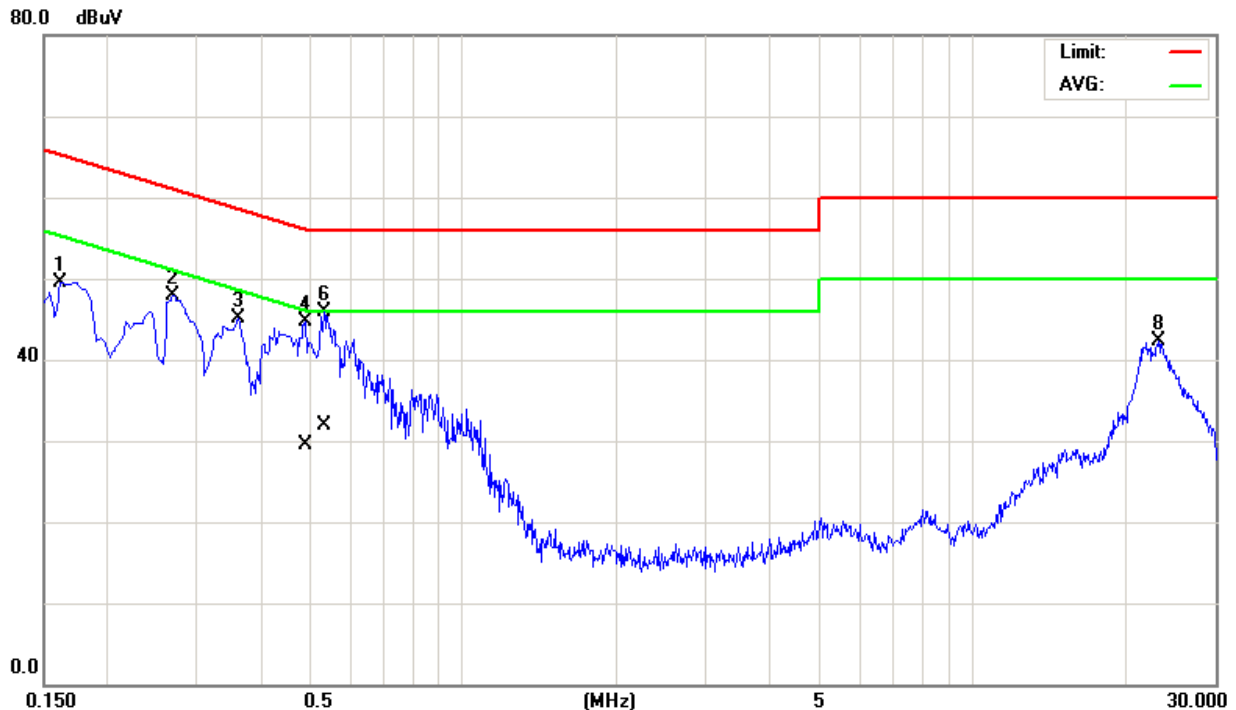


EUT :	HSPA+ Module	Model Name :	EM820W
Temperature :	25 °C	Relative Humidity :	53 %
Pressure :	1010hPa	Test Power :	AC 120V/60Hz
Test Mode :	FULL LOAD		

Freq. (MHz)	Terminal L/N	Measured(dBuV)		Limits(dBuV)		Margin (dB)	Note
		QP-Mode	AV-Mode	QP-Mode	AV-Mode		
0.16	Neutral	49.59	*	65.36	55.36	-15.77	(QP)
0.27	Neutral	47.83	*	61.12	51.12	-13.29	(QP)
0.36	Neutral	45.14	*	58.68	48.68	-13.54	(QP)
0.49	Neutral	44.62	29.48	56.17	46.17	-11.55	(QP)
0.53	Neutral	45.82	31.95	56.00	46.00	-10.18	(QP)
23.20	Neutral	42.29	*	60.00	50.00	-17.71	(QP)

**Remark**

- (1) All readings are QP Mode value unless otherwise stated AVG in column of 'Note'. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform. In this case, a "\*" marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150KHz to 30MHz.





## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 RADIATED EMISSION LIMITS (Frequency Range 9KHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

### LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	(dBuV/m) (at 3m)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

### FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5 <sup>th</sup> harmonic of the highest frequency or 40 GHz, whichever is lower





#### 4.2.2 MEASUREMENT INSTRUMENTS LIST AND SETTING

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	Schwarzbeck	VULB9160	9160-3232	Jun .04.2012
2	Amplifier	HP	8447D	2944A09673	May.26.2012
3	Test Receiver	R&S	ESCI	100382	May.26.2012
4	Test Cable	N/A	C-01_CB03	N/A	Jul.01.2012
5	Antenna	ETS	3115	00075789	May.26.2012
6	Amplifier	Agilent	8449B	3008A02274	May.26.2012
7	Spectrum	Agilent	E4408B	US39240143	Nov.25.2012
8	Test Cable	HUBER+SUHNER	C-45	N/A	May.04.2013
9	Controller	CT	SC100	N/A	N/A
10	Active Loop Antenna	R&S	HFH2-Z2	830749/020	May.26.2012
11	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Oct.13.2012

Remark: " N/A " denotes No Model Name / Serial No. and No Calibration specified.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~90kHz for PK/AVG detector
Start ~ Stop Frequency	90kHz~110kHz for QP detector
Start ~ Stop Frequency	110kHz~490kHz for PK/AVG detector
Start ~ Stop Frequency	490kHz~30MHz for QP detector
Start ~ Stop Frequency	30MHz~1000MHz for QP detector



#### **4.2.3 TEST PROCEDURE**

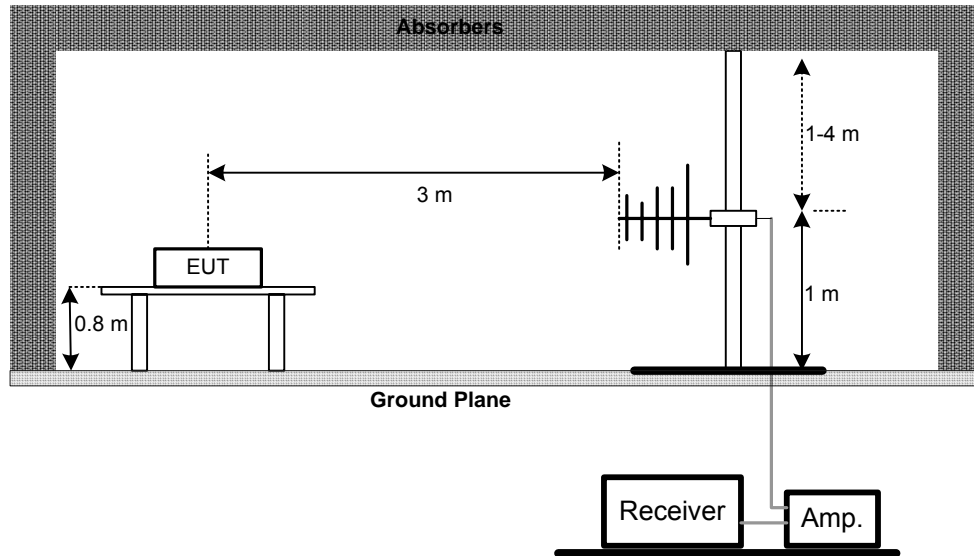
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

#### **4.2.4 DEVIATION FROM TEST STANDARD**

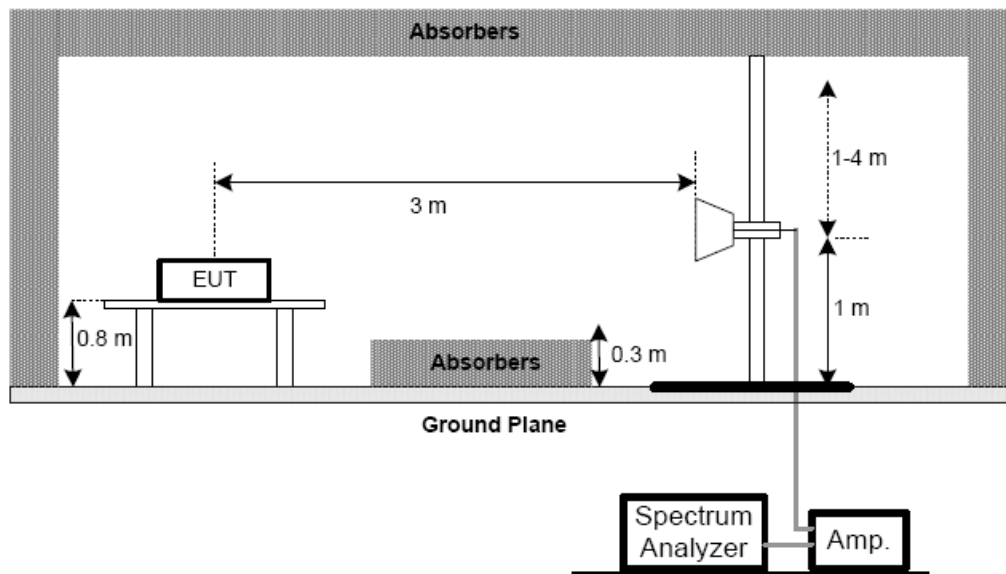
No deviation

#### 4.2.5 TEST SETUP

##### (A) Radiated Emission Test Set-Up Frequency Below 1 GHz



##### (B) Radiated Emission Test Set-Up Frequency Above 1 GHz



#### 4.2.6 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.



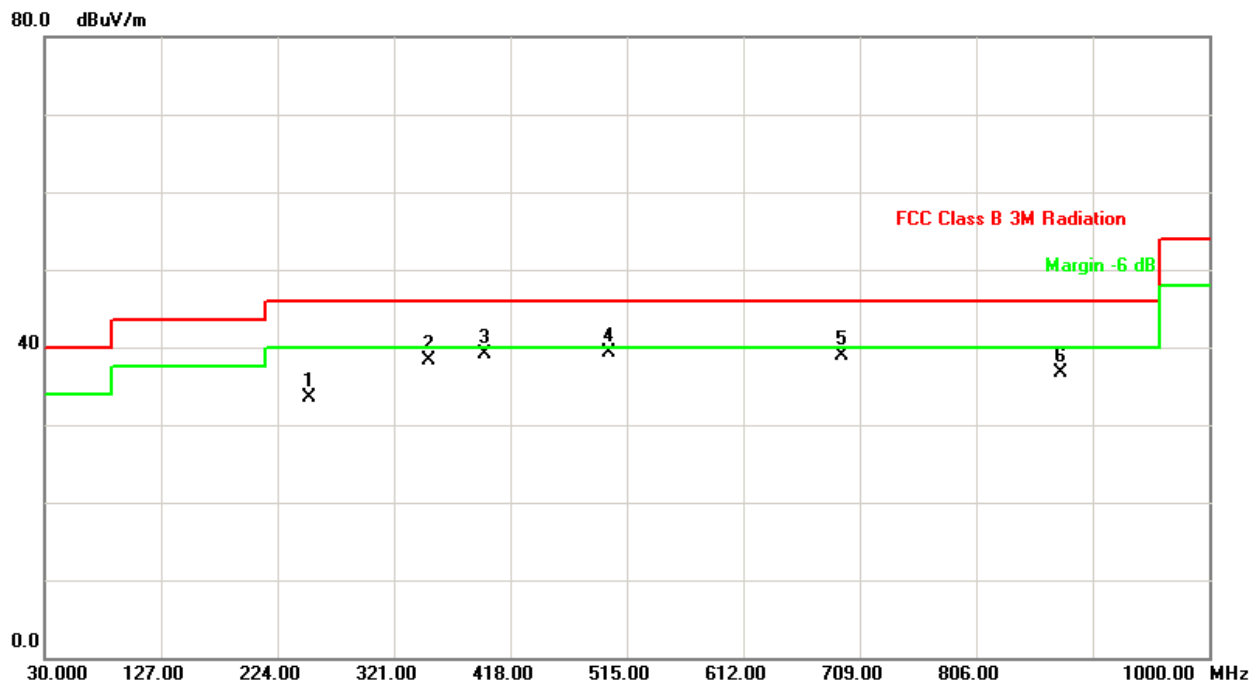
#### 4.2.7 TEST RESULTS (BETWEEN 30 – 1000 MHZ)

EUT :	HSPA+ Module	Model Name :	EM820W
Temperature :	25 °C	Relative Humidity :	53 %
Pressure :	1010hPa	Test Power :	AC 120V/60Hz
Test Mode :	TX WCDMA Band V Channel 4182 11G Channel 6		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
250.68	V	48.01	-14.51	33.50	46.00	- 12.50	
350.10	V	49.19	-10.84	38.35	46.00	- 7.65	
396.18	V	48.18	-9.16	39.02	46.00	- 6.98	
500.45	V	46.73	-7.34	39.39	46.00	- 6.61	
694.45	V	42.06	-3.20	38.86	46.00	- 7.14	
876.33	V	37.10	-0.45	36.65	46.00	- 9.35	

#### Remark :

- (1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz ; SPA setting in RBW=120KHz, VBW =120KHz, Swp. Time = 0.3 sec./MHz ◦
- (2) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (3) Measuring frequency range from 30MHz to 1000MHz ◦
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table ◦



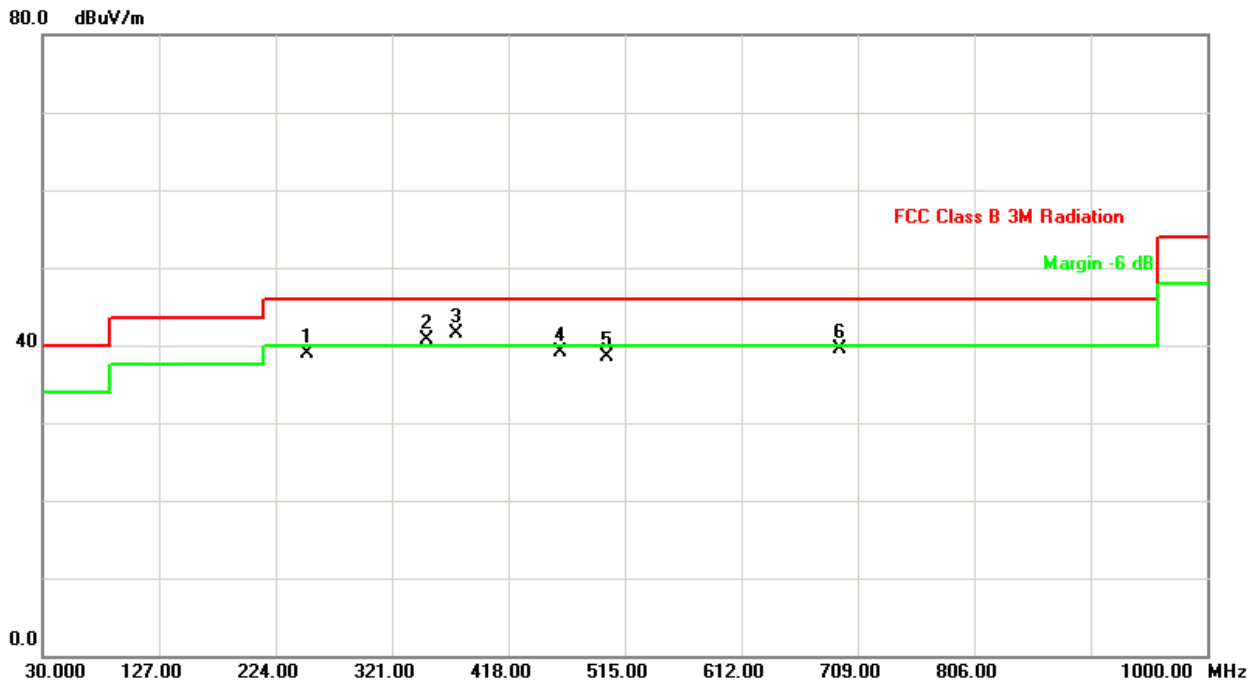


EUT :	HSPA+ Module	Model Name :	EM820W
Temperature :	25 °C	Relative Humidity :	53 %
Pressure :	1010hPa	Test Power :	AC 120V/60Hz
Test Mode :	TX WCDMA Band V Channel 4182 11G Channel 6		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
250.68	H	53.40	-14.51	38.89	46.00	- 7.11	
350.10	H	51.59	-10.84	40.75	46.00	- 5.25	
374.35	H	51.55	-9.95	41.60	46.00	- 4.40	
461.65	H	47.13	-7.93	39.20	46.00	- 6.80	
500.45	H	45.88	-7.34	38.54	46.00	- 7.46	
694.45	H	42.78	-3.20	39.58	46.00	- 6.42	

**Remark :**

- (1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz ; SPA setting in RBW=120KHz, VBW=120KHz, Swp. Time = 0.3 sec./MHz ◦
- (2) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (3) Measuring frequency range from 30MHz to 1000MHz ◦
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table ◦





#### 4.2.8 TEST RESULTS (ABOVE 1000 MHZ)

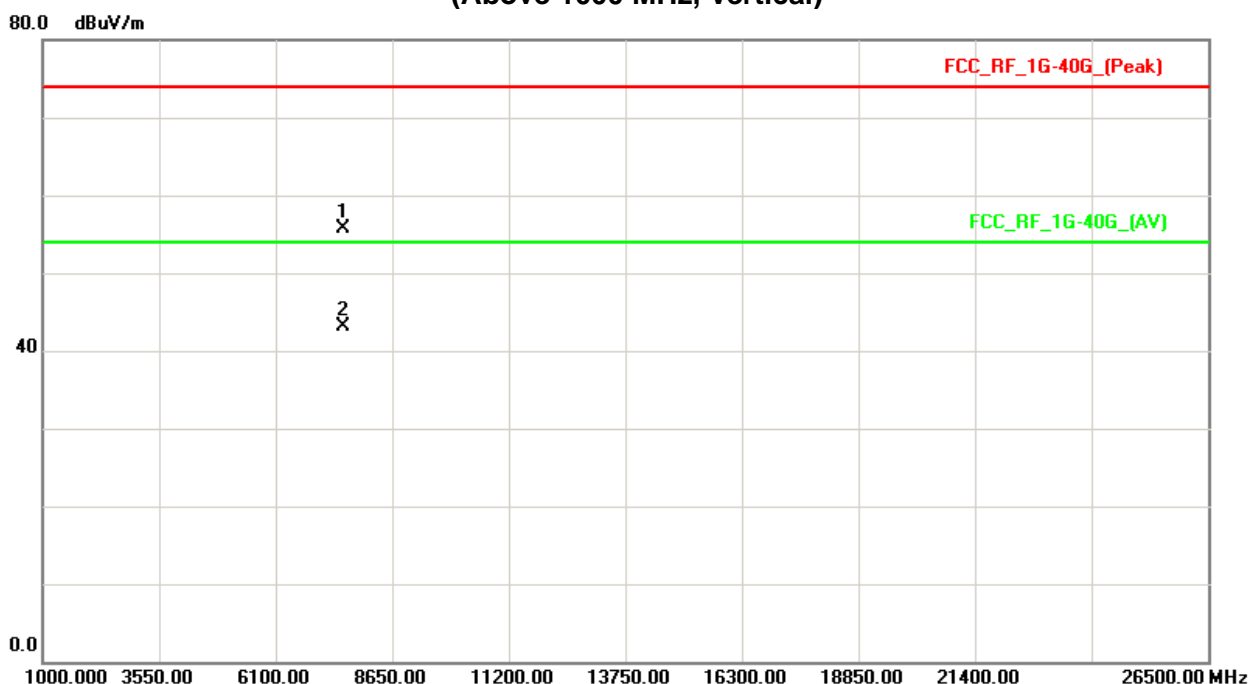
EUT :	Access Router	Model Name. :	EM820W
Temperature :	25 °C	Relative Humidity :	53 %
Pressure :	1010 hPa	Test Power :	AC 120V/60Hz
Test Mode :	TX WCDMA Band V Channel 4182 11G Channel 6		

Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
1653.24	V	47.80	38.65	-4.73	43.07	33.92	74.00	54.00	X/H
4875.02	V	43.29	34.74	5.48	48.77	40.22	74.00	54.00	X/H

#### Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency ◦ "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission ◦
- (4) Data of measurement within this frequency range shown " \* " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :  
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand

#### (Above 1000 MHz, Vertical)





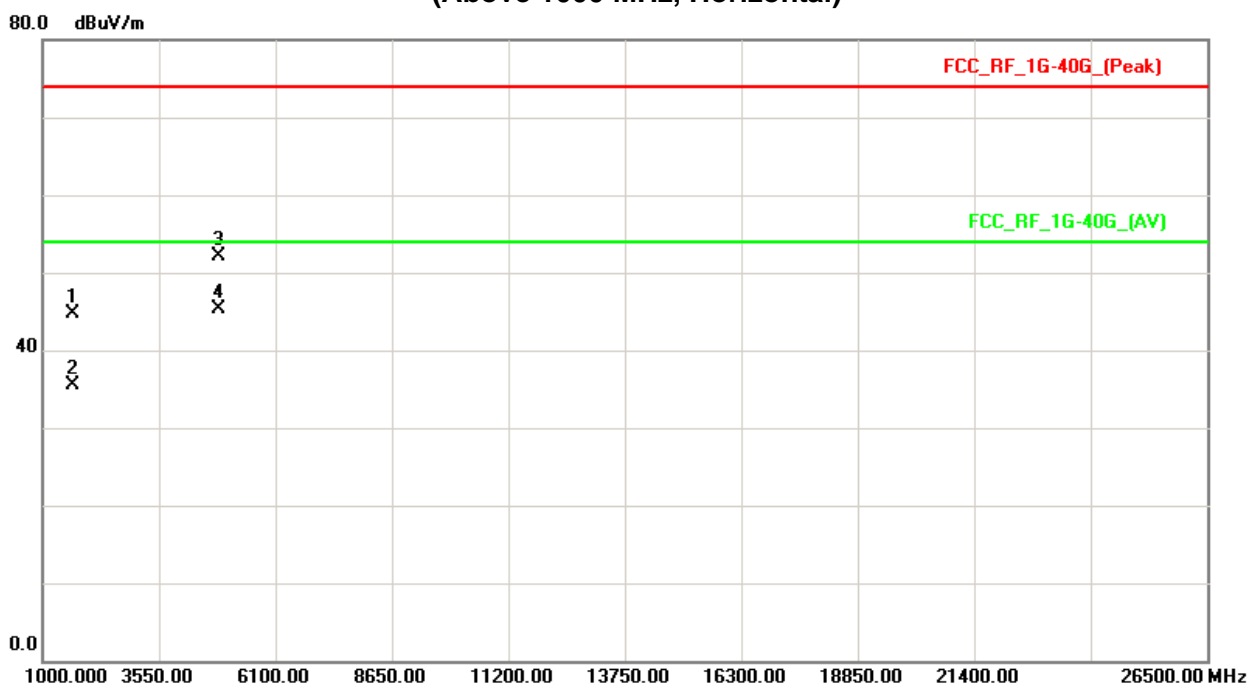
EUT :	Access Router	Model Name. :	EM820W
Temperature :	25 °C	Relative Humidity :	53 %
Pressure :	1010 hPa	Test Power :	AC 120V/60Hz
Test Mode :	TX WCDMA Band V Channel 4182 11G Channel 6		

Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
4652.87	H	49.52	40.18	-4.74	44.78	35.44	74.00	54.00	X/H
4874.13	H	46.63	39.87	5.47	52.10	45.34	74.00	54.00	X/H

**Remark :**

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency ◦ "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission ◦
- (4) Data of measurement within this frequency range shown " \* " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :  
 "X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand

**(Above 1000 MHz, Horizontal)**





### 4.3 SPURIOUS RADIATED EMISSIONS MEASUREMENT

#### 4.3.1 LIMIT

In the FCC 24.238(a), On any frequency outside a licensee's frequency block within USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB. The limit translates in the relevant power range (1 to 0.001W). At 1W(Power Control Level 0) the specified minimum attenuation becomes 43dB and the limit of emission equal to  $-13\text{dBm}$ . At 0.001W(Power Control Level 15) the specified minimum attenuation becomes 13dB and the emission of limit equal to  $-13\text{dBm}$ . So the limit of emission is the same absolute specified line.

#### 4.3.2 MEASURING INSTRUMENTS AND SETTING

Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Start Frequency	30 MHz
Stop Frequency	10th carrier harmonic
Detector	Positive Peak
Span	100 MHz
Sweep Time	1s
RBW / VBW	1 MHz / 1MHz
Attenuation	Positive Peak

#### 4.3.3 TEST PROCEDURES

1. The EUT was placed on the top of the turntable in fully anechoic chamber.
2. The test shall be made in the transmitting mode. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. This measurement shall be repeated with the transmitter in standby mode where applicable.
4. For 30~1000MHz spurious emissions measurement, the broad band bi-log receiving antenna was placed 3 meters far away from the turntable. For 1~10th carrier harmonic measurement, the receiving Horn antenna was placed 1.5 meters far away from the turntable.
5. The broadband receiving antenna was fixed on the same height with the EUT to find each suspected emissions of both horizontal and vertical polarization. Each recorded suspected value is indicated as Read Level (Raw).
6. Replace the EUT by standard antenna and feed the RF port by signal generator.
7. Adjust the frequency of the signal generator to the suspected emission and slightly rotate the turntable to locate the position with maximum reading.
8. Adjust the power level of the signal generator to reach the same reading with Read Level (Raw).
9. The level of the spurious emission is the power level of (8) plus the gain of the standard antenna in dBi and minus the loss of the cable used between the signal generator and the standard antenna.





#### **4.3.4 TEST SETUP LAYOUT**

This test setup layout is the same as that shown in section 4.2.4.

#### **4.3.5 TEST DEVIATION**

There is no deviation with the original standard.

#### **4.3.6 EUT OPERATION DURING TEST**

The BS simulator was used to set the TX channel and power level and modulate the TX signal.



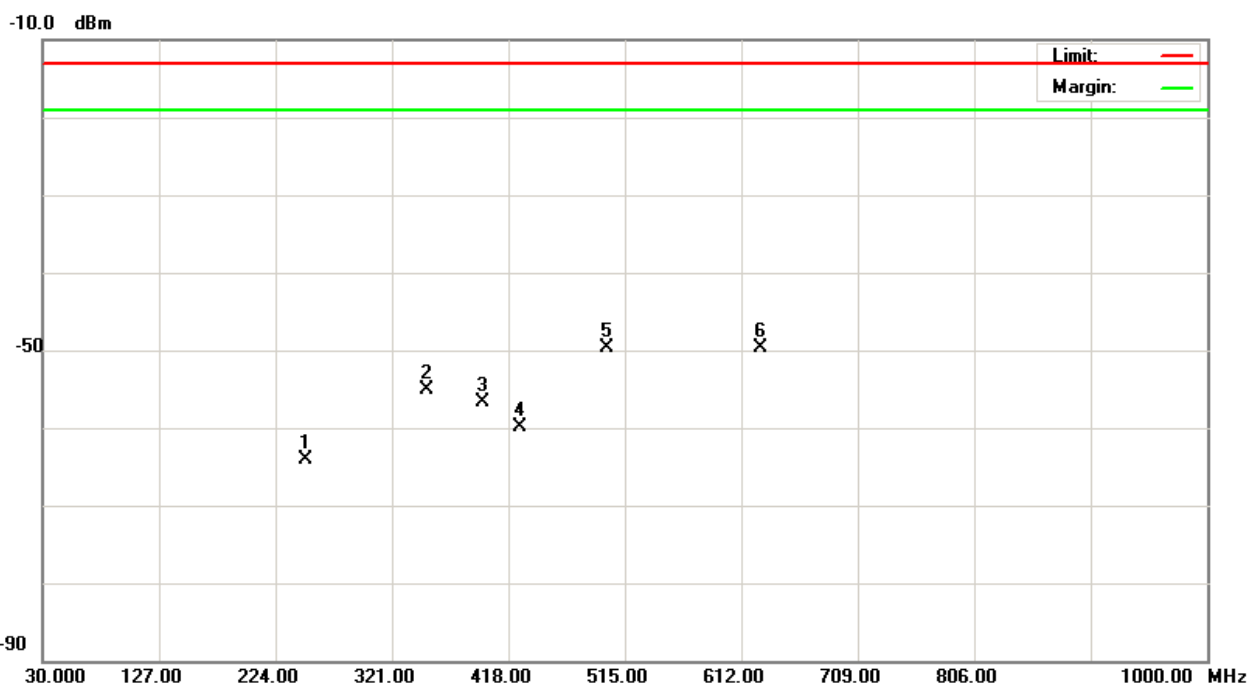
#### 4.3.7 RESULTS OF TRANSMITTER SPURIOUS EMISSIONS BELOW 1GHZ

EUT :	HSPA+ Module	Model Name :	EM820W
Temperature :	25 °C	Relative Humidity :	53 %
Pressure :	1010hPa	Test Power :	AC 120V/60Hz
Test Mode :	TX WCDMA Band V Channel 4182 11G Channel 6		

Frequency (MHz)	Ant H / V	EUT Axis (X/Y/Z)	TX/RX	Measure d(FS) (dBm)	Limits (dBm)	Margins	Note
249.22	V	X	TX	-64.18	-13.00	-51.18	
350.10	V	X	TX	-55.07	-13.00	-42.07	
396.66	V	X	TX	-56.76	-13.00	-43.76	
426.62	V	X	TX	-59.81	-13.00	-46.81	
499.48	V	X	TX	-49.79	-13.00	-36.79	
627.52	V	X	TX	-49.61	-13.00	-36.61	

#### Remark :

- (1) Reading in which marked as Peak means measurements by using is Peak Mode with Detector SPA setting in RBW=1MHz, VBW =1MHz, Swp. Time = 0.3 sec./MHz ◦
- (2) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (3) Measuring frequency range from 30MHz to 1000MHz ◦
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table ◦



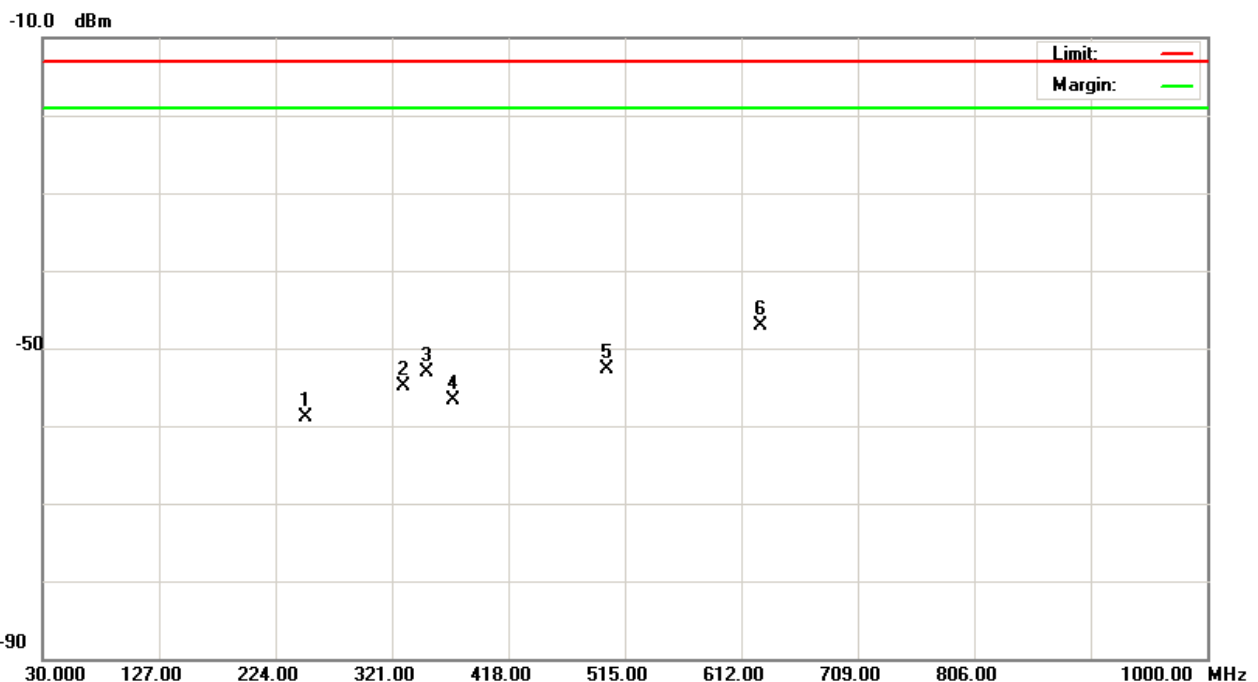


EUT :	HSPA+ Module	Model Name :	EM820W
Temperature :	25 °C	Relative Humidity :	53 %
Pressure :	1010hPa	Test Power :	AC 120V/60Hz
Test Mode :	TX WCDMA Band V Channel 4182 11G Channel 6		

Frequency (MHz)	Ant H / V	EUT Axis (X/Y/Z)	TX/RX	Measure d(FS)	Limits	Margins	Note
249.22	H	X	TX	-58.81	-13.00	-45.81	
330.70	H	X	TX	-54.99	-13.00	-41.99	
350.10	H	X	TX	-53.11	-13.00	-40.11	
369.66	H	X	TX	-56.73	-13.00	-43.73	
499.48	H	X	TX	-52.75	-13.00	-39.75	
627.52	H	X	TX	-47.15	-13.00	-34.15	

**Remark :**

- (1) Reading in which marked as Peak means measurements by using is Peak Mode with Detector SPA setting in RBW=1MHz, VBW =1MHz, Swp. Time = 0.3 sec./MHz ◦
- (2) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (3) Measuring frequency range from 30MHz to 1000MHz ◦
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table ◦





#### 4.3.8 RESULTS OF TRANSMITTER SPURIOUS EMISSIONS ABOVE 1GHZ

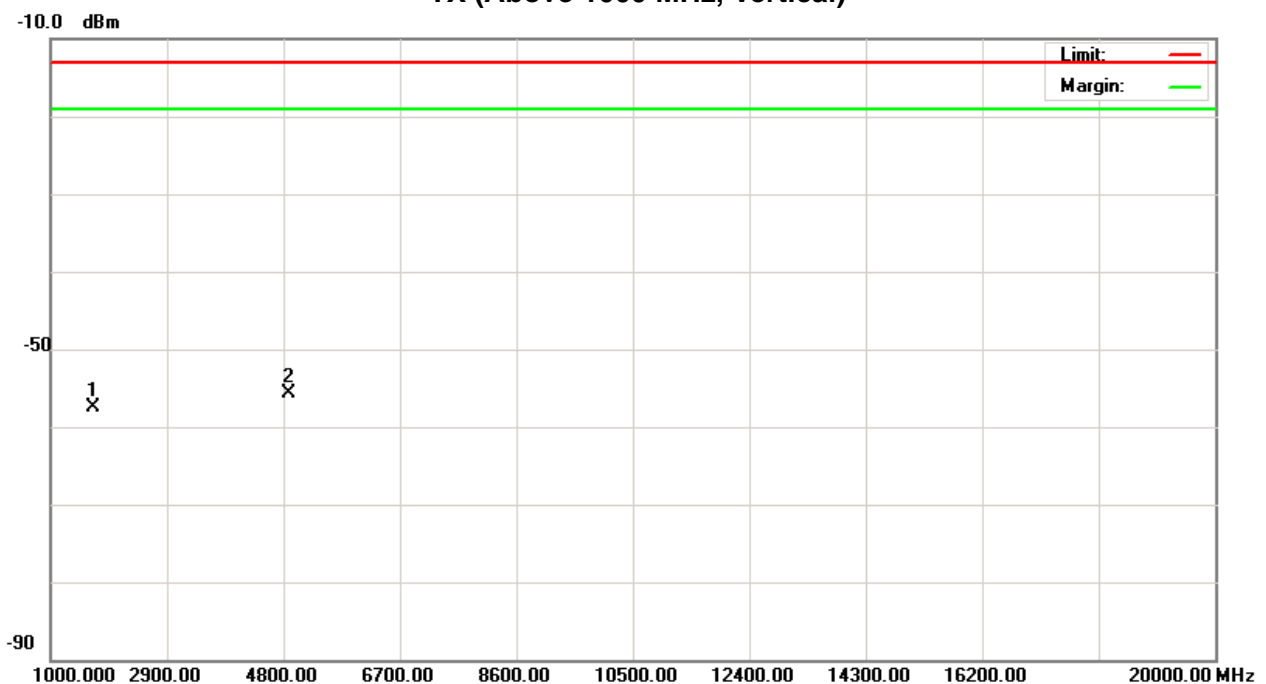
EUT :	HSPA+ Module	Model Name :	EM820W
Temperature :	25 °C	Relative Humidity :	53 %
Pressure :	1010hPa	Test Power :	AC 120V/60Hz
Test Mode :	TX WCDMA Band V Channel 4182 11G Channel 6		

Frequency (MHz)	Ant H / V	EUT Axis (X/Y/Z)	TX/RX	Measure d(FS) (dBm)	Limits (dBm)	Margins	Note
1652.17	V	X	TX	-57.41	-13.00	-44.41	
4874.69	V	X	TX	-55.74	-13.00	-42.74	

**Remark :**

- (1) Reading in which marked as Peak means measurements by using is Peak Mode with Detector SPA setting in RBW=1MHz, VBW =1MHz, Swp. Time = 0.3 sec./MHz ◦
- (2) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (3) Measuring frequency range from 30MHz to 1000MHz ◦
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table ◦

**TX (Above 1000 MHz, Vertical)**





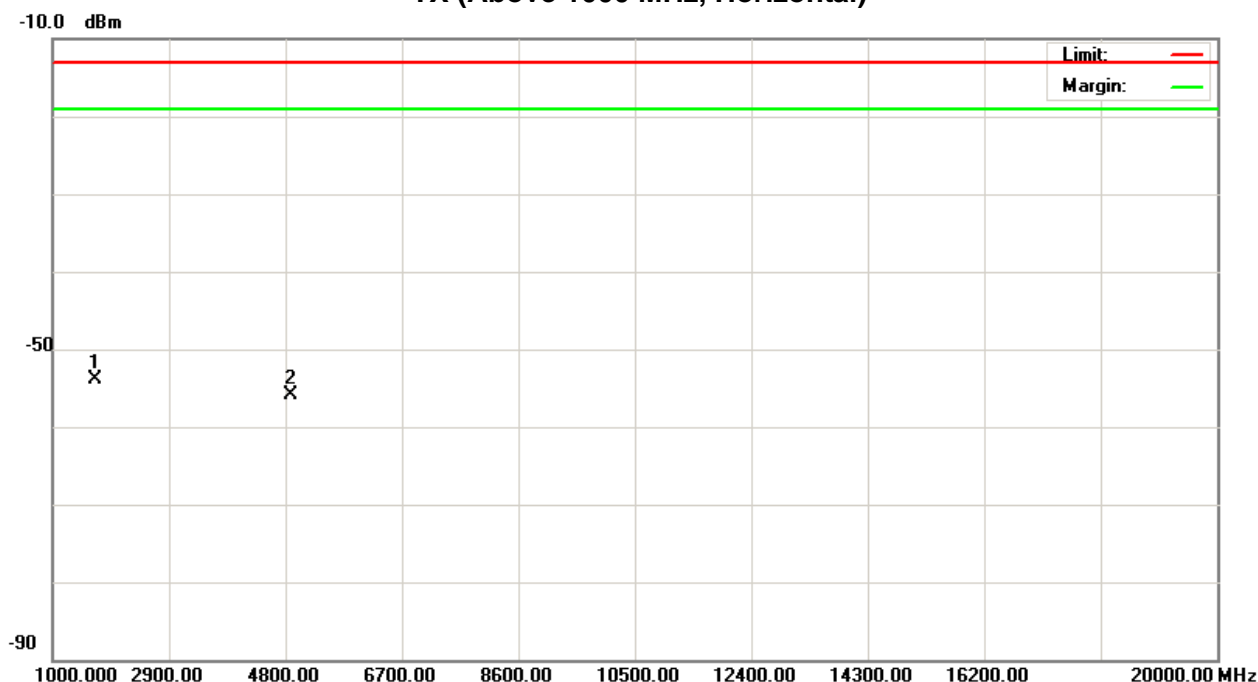
EUT :	HSPA+ Module	Model Name :	EM820W
Temperature :	25 °C	Relative Humidity :	53 %
Pressure :	1010hPa	Test Power :	AC 120V/60Hz
Test Mode :	TX WCDMA Band V Channel 4182 11G Channel 6		

Frequency (MHz)	Ant H / V	EUT Axis (X/Y/Z)	TX/RX	Measure d(FS) (dBm)	Limits (dBm)	Margins	Note
1653.11	H	X	TX	-53.89	-13.00	-40.89	
4873.95	H	X	TX	-55.99	-13.00	-42.99	

**Remark :**

- (1) Reading in which marked as Peak means measurements by using is Peak Mode with Detector SPA setting in RBW=1MHz, VBW =1MHz, Swp. Time = 0.3 sec./MHz ◦
- (2) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (3) Measuring frequency range from 30MHz to 1000MHz ◦
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table ◦

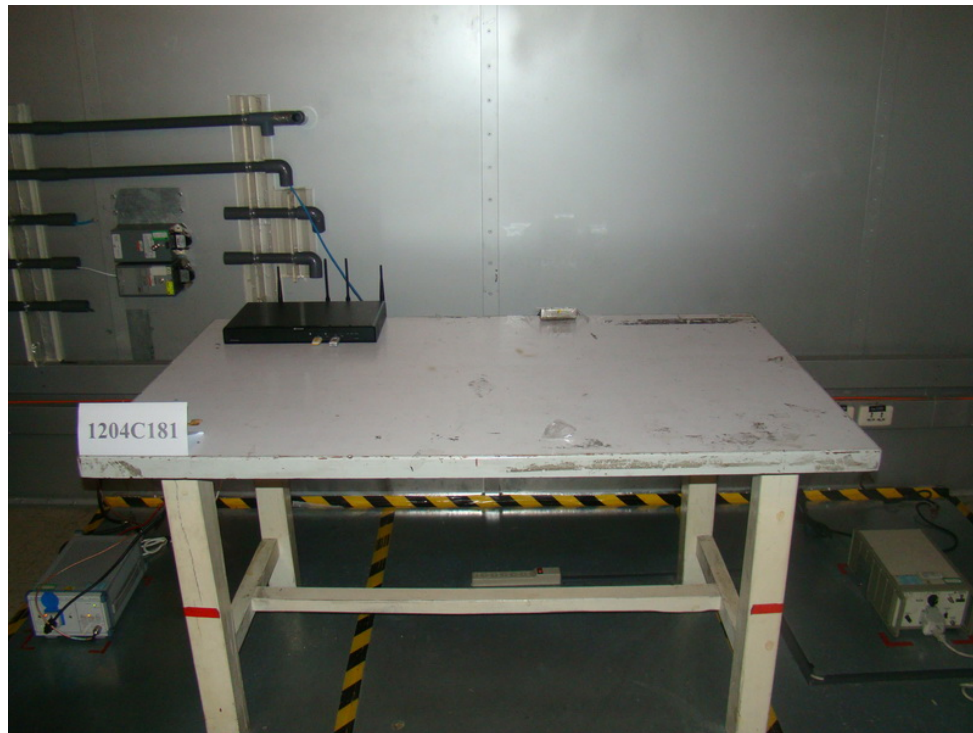
**TX (Above 1000 MHz, Horizontal)**





**5. EUT TEST PHOTO**

**Conducted Measurement Photos**





**Radiated Measurement Photos**

