Radio Test Report

FCC ID: H8GRG30

This report concerns (check one) : ■ **Original Grant** □ **Class I Change**

Issued Date : Apr. 24, 2009
Project No. : R0903009
Equipment : 2.4G RF Dongle
Model Name : RG-30

Applicant : A-FOUR TECH CO., LTD.
Address : 6F, No.108, Min-Chuan Rd., Hsin-Tien, Taipei, Taiwan, R.O.C.

Tested by:
Neutron Engineering Inc. EMC Laboratory
Date of Test:
Mar. 30, 2009 ~ Apr. 13, 2009

Testing Engineer : Rush Kao
(Rush Kao)

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(Jeff Yang)

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NVLAP Lab Code: 200145-0

ilac-MRA TAF Testing Laboratory 0659

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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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: 2.4G RF Dongle
Brand Name: A4TECH
Model No.: RG-30
Applicant: A-FOUR TECH CO., LTD.
Date of Test: Mar. 30, 2009 ~ Apr. 13, 2009
Test Item: ENGINEERING SAMPLE
Standards: FCC Part15, Subpart C(15.247) / ANCI C63.4 : 2003

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-R0903009) 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:

FCC Part15, Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247 (c)	Antenna conducted Spurious Emission	PASS	
15.247 (a)(2)	6dB Bandwidth	PASS	
15.247 (b)	Peak Output Power	PASS	
15.247 (c)	Radiated Spurious Emission	PASS	
15.247 (d)	Power Spectral Density	PASS	
15.203	Antenna Requirement	PASS	
1.1307 1.1310 2.1091 2.1093	RF Exposure Compliance	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

2.1 TEST FACILITY

The test facilities used to collect the test data in this report is **C01/OS01(FCC R.N.: 95335)** at the location of No.132-1, Lane 329, Sec. 2, Palain Road, Shijr City, Taipei, Taiwan.
Neutron's test firm number is 95335

2.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**，where expended 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
C01	ANSI	150 KHz ~ 30MHz	1.94	

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U，(dB)	NOTE
OS-01	ANSI	30MHz ~ 200MHz	V	2.86	
		30MHz ~ 200MHz	H	2.56	
		200MHz ~ 1,000MHz	V	2.88	
		200MHz ~ 1,000MHz	H	2.98	
OS-02	ANSI	30MHz ~ 200MHz	V	2.48	
		30MHz ~ 200MHz	H	2.16	
		200MHz ~ 1,000MHz	V	2.50	
		200MHz ~ 1,000MHz	H	2.66	

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	2.4G RF Dongle
Brand Name	A4TECH
Model No.	RG-30
OEM Brand/Model No.	G-Cube/GRKSA-610SR; GRKSA-610SS; GRKSA-670D; GRKST-520C
Model Difference	Models' differences between each other only the changes of model name which do not affect the EMI performance. Model G7630 was used for final testing and collecting test data included in this report.
Product Description	The EUT is a 2.4G RF Dongle. Operation Frequency: 2406.5~2472.5MHz Modulation Type: GFSK Number Of Channel 29CH Antenna Designation: Please refer to the Note 3. Antenna Gain(Peak) Please refer to the Note 3. Output Power: 0.23 dBm (Max.) 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.
Channel List	Please refer to the Note 2.
Power Source	Supplied from PC USB port.
Power Rating	Supplied from PC USB port.
Connecting I/O Port(s)	Please refer to the User's Manual
Products Covered	NA

Note:

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

2.

Channel List							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	**2406.5**	08	2423.5	16	2442.5	24	2461.5
01	2408.5	09	2425.5	17	2444.5	25	2464.5
02	2410.5	10	2427.5	18	2446.5	26	2467.5
03	2406.5.5	11	2429.5	19	2450.5	27	2470.5
04	2414.5	12	2433.5	20	2453.5	**28**	**2472.5**
05	2416.5	13	2436.5	21	2455.5		
06	2419.5	**14**	**2438.5**	22	2457.5		
07	2421.5	15	2440.5	23	2459.5		

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Printer Antenna	N/A	5.21

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 possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

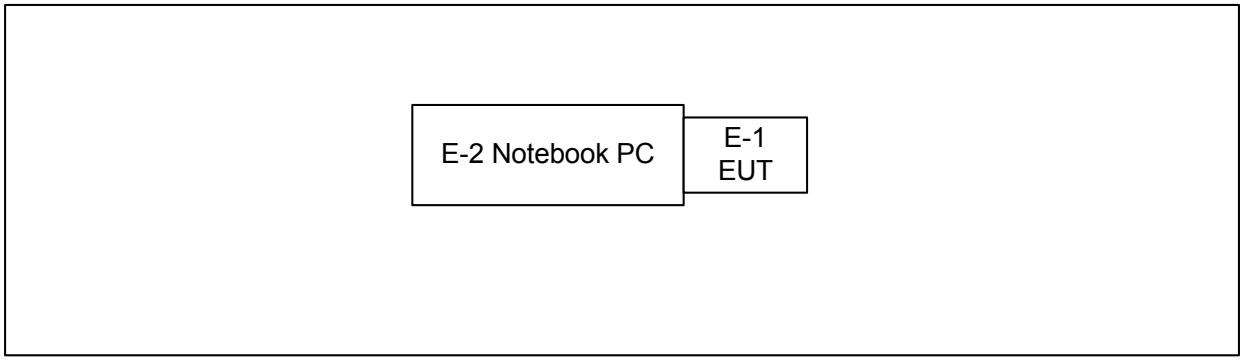
Pretest Test Mode	Description
Mode 1	CH00
Mode 2	CH14
Mode 3	CH28

For Conducted Test	
Final Test Mode	Description
Mode 2	CH14

For Radiated Test (30 -1000MHz)	
Final Test Mode	Description
Mode 2	CH14

For Radiated Test (Above 1000MHz)	
Final Test Mode	Description
Mode 1	CH00
Mode 2	CH14
Mode 3	CH28

3.3 BLOCK DIAGRAM 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	2.4G RF Dongle	A4TECH	RG-30	H8GRG30	N/A	EUT
E-2	Notebook PC	DELL	D600	DOC	7T390 A03	

Item	Shielded Type	Ferrite Core	Length	Note
	N/A	N/A	N/A	

Note:

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

4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 POWER LINE CONDUCTED EMISSION (FREQUENCY RANGE 150KHZ-30MHZ)

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

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

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Test Cable	N/A	SR03_C_01 &02	N/A	Oct. 19, 2009
2	LISN	EMCO	3816/2	00042991	Jan. 21, 2010
3	Pulse Limiter	Electro-Metrics	EM-7600	112644	Dec. 28, 2009
4	50Ω Terminator	N/A	N/A	N/A	May 13, 2009
5	EMI Test Receiver	R&S	ESCI	100082	Mar. 17, 2010
6	LISN	EMCO	4825/2	00028234	Jul. 09, 2009

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

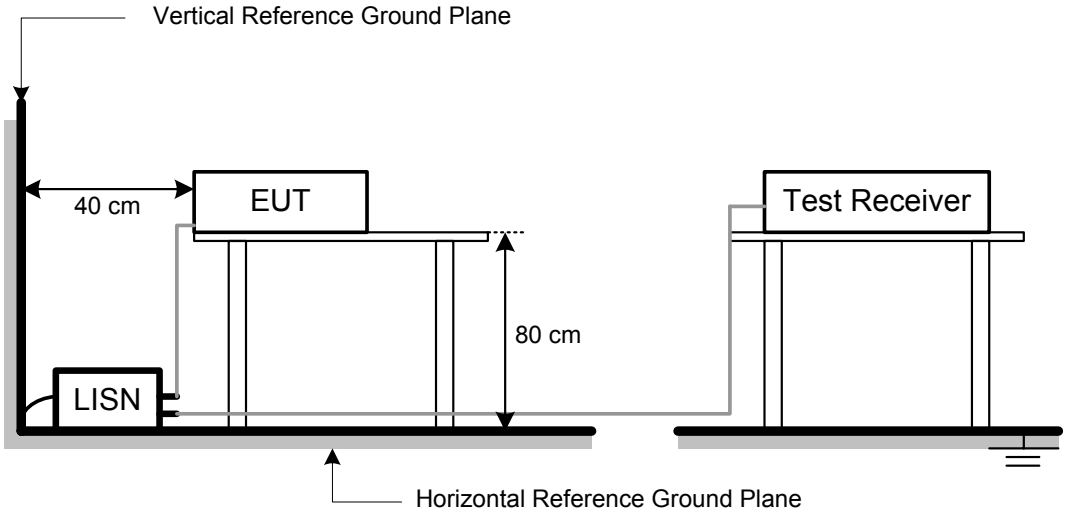
4.1.3 TEST PROCEDURE

a. 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.
b. 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.
c. 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.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. 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



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

E.U.T :	2.4G RF Dongle	Model Name :	RG-30
Temperature :	25°C	Relative Humidity :	60%
Test Voltage :	AC 120V/60Hz		
Test Mode :	CH14		

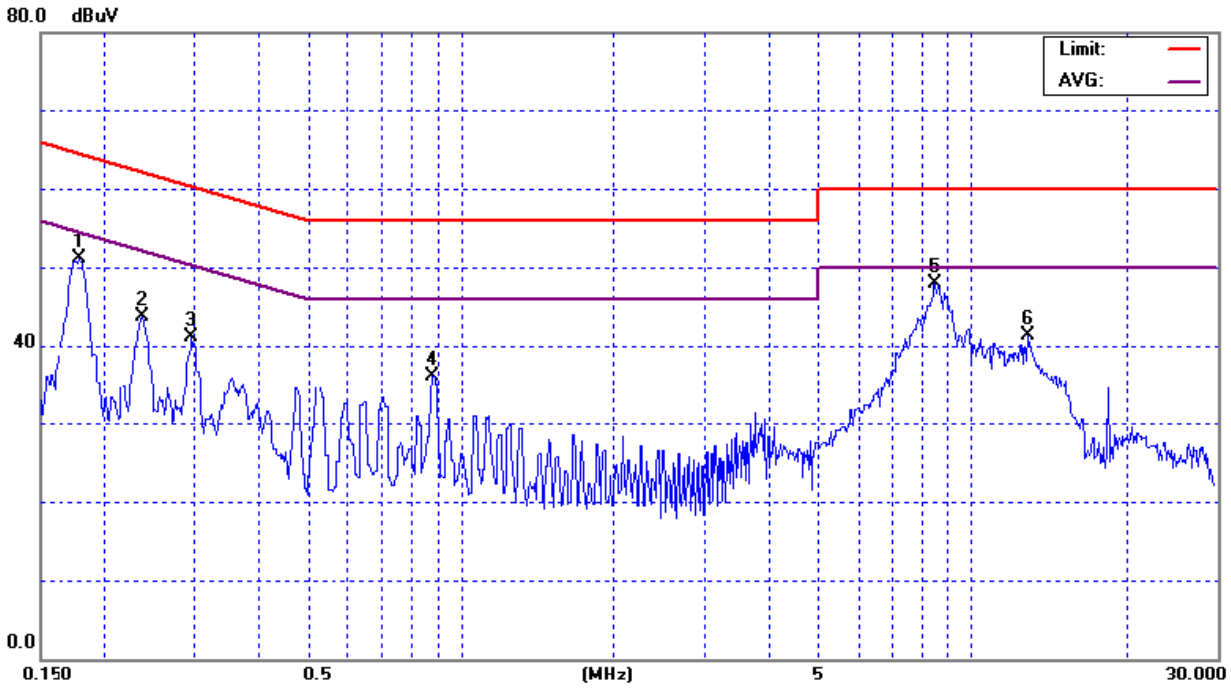
Freq. (MHz)	Terminal L/N	Measured(dBuV)		Limits(dBuV)		Margin (dB)	Note
		QP-Mode	AV-Mode	QP-Mode	AV-Mode		
0.18	Line	51.01	*	64.50	54.50	-13.49	(QP)
0.24	Line	43.75	*	62.17	52.17	-18.42	(QP)
0.30	Line	41.13	*	60.32	50.32	-19.19	(QP)
0.88	Line	36.06	*	56.00	46.00	-19.94	(QP)
8.50	Line	47.96	*	60.00	50.00	-12.04	(QP)
12.85	Line	41.39	*	60.00	50.00	-18.61	(QP)

Remark

(1) Reading in which marked as QP means measurements by using are Quasi-Peak Mode with Detector BW=9KHz；SPA setting in RBW=10KHz,VBW =10KHz, Swp. Time = 0.2 sec./MHz。Reading in which marked as AV means measurements by using are Average Mode with instrument setting in RBW=10KHz,VBW=10KHz, Swp. Time =0.2 sec./MHz。

(2) 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。

(3) Measuring frequency range from 150KHz to 30MHz。



E.U.T :	2.4G RF Dongle	Model Name :	RG-30
Temperature :	25°C	Relative Humidity :	60%
Test Voltage :	AC 120V/60Hz		
Test Mode :	CH14		

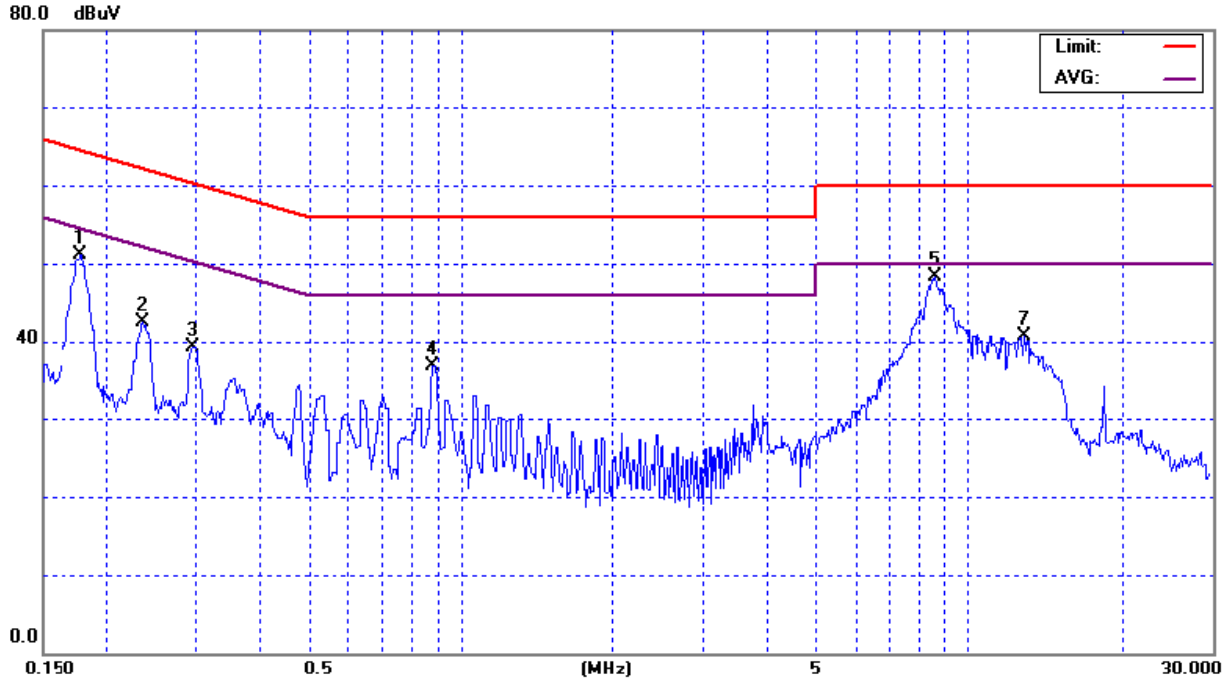
Freq. (MHz)	Terminal L/N	Measured(dBuV)		Limits(dBuV)		Margin (dB)	Note
		QP-Mode	AV-Mode	QP-Mode	AV-Mode		
0.18	Neutral	51.10	*	64.55	54.55	-13.45	(QP)
0.24	Neutral	42.45	*	62.22	52.22	-19.77	(QP)
0.30	Neutral	39.25	*	60.37	50.37	-21.12	(QP)
0.88	Neutral	36.83	*	56.00	46.00	-19.17	(QP)
8.64	Neutral	48.25	40.09	60.00	50.00	-9.91	(AV)
12.85	Neutral	40.78	*	60.00	50.00	-19.22	(QP)

Remark

(1) Reading in which marked as QP means measurements by using are Quasi-Peak Mode with Detector BW=9KHz；SPA setting in RBW=10KHz,VBW =10KHz, Swp. Time = 0.2 sec./MHz。Reading in which marked as AV means measurements by using are Average Mode with instrument setting in RBW=10KHz,VBW=10KHz, Swp. Time =0.2 sec./MHz。

(2) 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。

(3) 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 on15.205(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)	Class B (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).

4.2.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Log-Bicon Antenna	Schwarzbeck	VULB 9160	3176	Jul. 24, 2009
2	Test Cable	N/A	10M_OS01	N/A	Oct. 20, 2009
3	Test Cable	N/A	OS01-1/-2	N/A	Oct. 08, 2009
4	Pre-Amplifier	Anritsu	MH648A	M09961	Dec. 29, 2009
5	Spectrum Analyzer	HP	8591EM	3536A00681010	Mar. 13, 2010
6	EMI Measuring Receiver	SHCAFFNER	SCR 3501	408	Nov. 24.2009
7	Spectrum Analyzer	R&S	FSP-30	100854	Apr. 14, 2009
8	Horn Antenna	Schwarzbeck	BBHA 9120 D	9120D-546	May 27, 2009
9	Microwave Pre_amplifier	Agilent	8449B	3008A02331	Jan. 19, 2010
10	Microflex Cable	NA	NA	1m	Sep. 15, 2009
11	Microflex Cable	NA	NA	10M	Feb. 19, 2010

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

4.2.3 TEST PROCEDURE

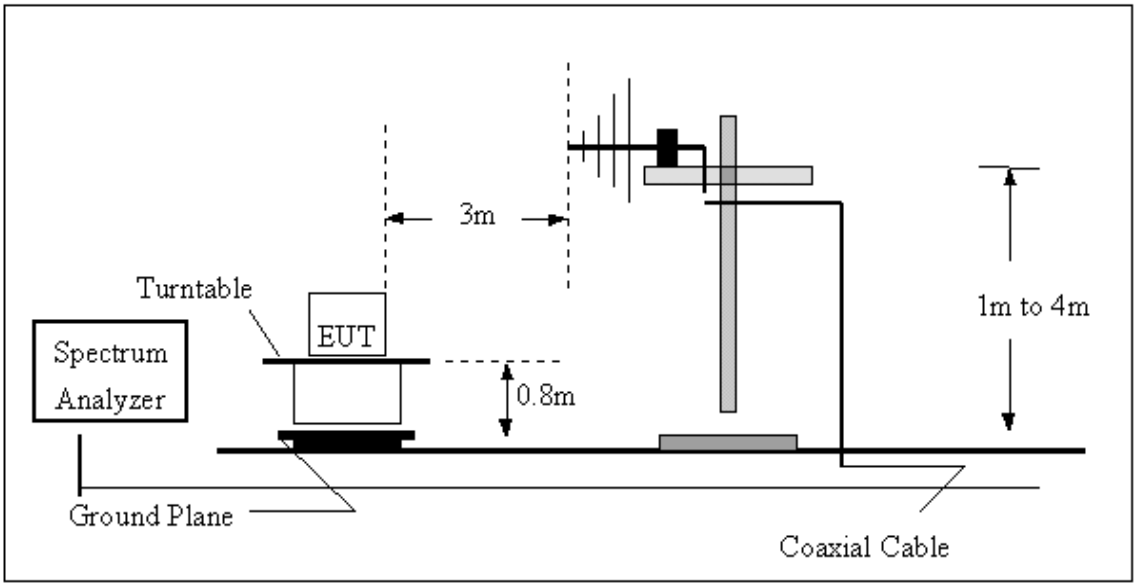
a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
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

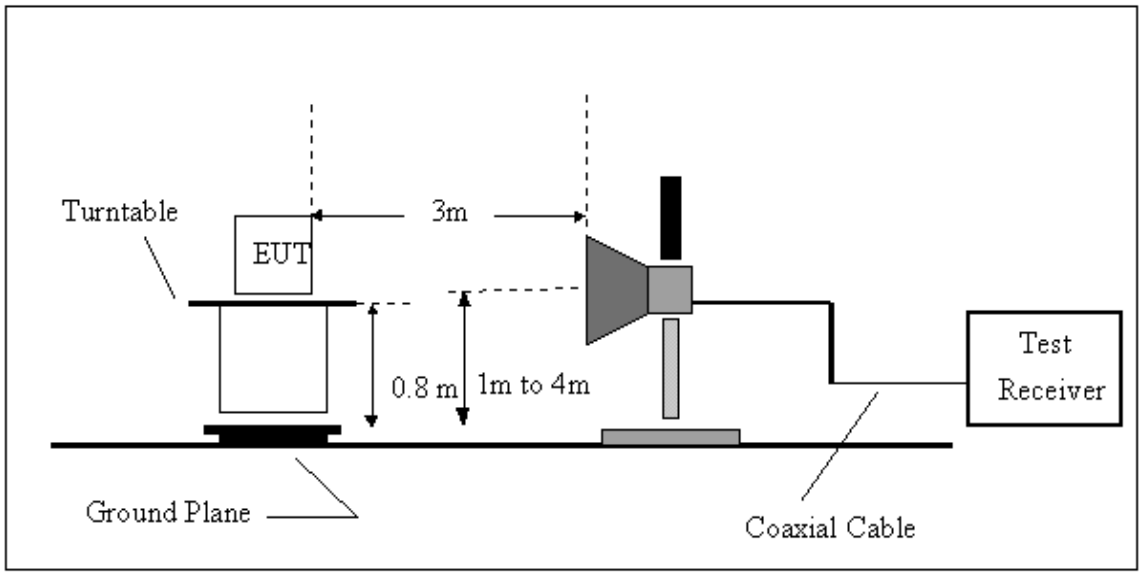
No deviation

4.2.5 TEST SETUP

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(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 30MHz – 1000MHz

EUT：	2.4G RF Dongle	Model No. ：	RG-30
Temperature：	18°C	Relative Humidity：	87%
Test Power ：	AC 120V/60Hz		
Test Mode ：	CH14		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
220.12	V	43.67	-14.61	29.06	46.00	- 16.94	
336.52	V	39.26	-10.12	29.14	46.00	- 16.86	
365.62	V	41.28	-9.02	32.26	46.00	- 13.74	
433.52	V	36.56	-7.10	29.46	46.00	- 16.54	
699.30	V	31.56	-1.40	30.16	46.00	- 15.84	
899.12	V	32.51	2.51	35.02	46.00	- 10.98	

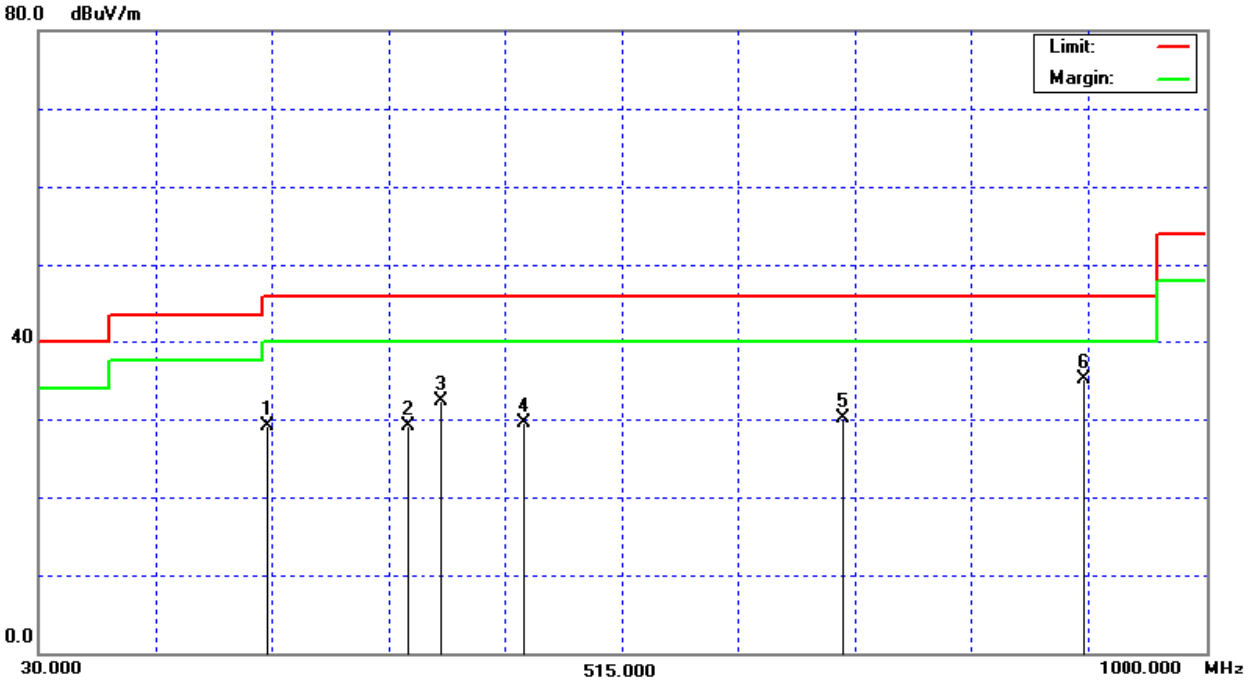
Remark：

(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 measure-ment didn't perform。

(3) Measuring frequency range from 30MHz to 1000MHz。

(4) If the peak scan value is under the limit for more than 20dB, the signal will not show in table。



EUT：	2.4G RF Dongle	Model No. ：	RG-30
Temperature：	18°C	Relative Humidity：	87%
Test Power ：	AC 120V/60Hz		
Test Mode ：	CH14		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
336.52	H	41.28	-10.12	31.16	46.00	- 14.84	
365.62	H	41.23	-9.02	32.21	46.00	- 13.79	
433.52	H	43.23	-7.10	36.13	46.00	- 9.87	
499.48	H	43.47	-5.33	38.14	46.00	- 7.86	
528.58	H	36.23	-4.68	31.55	46.00	- 14.45	
899.12	H	35.67	2.51	38.18	46.00	- 7.82	

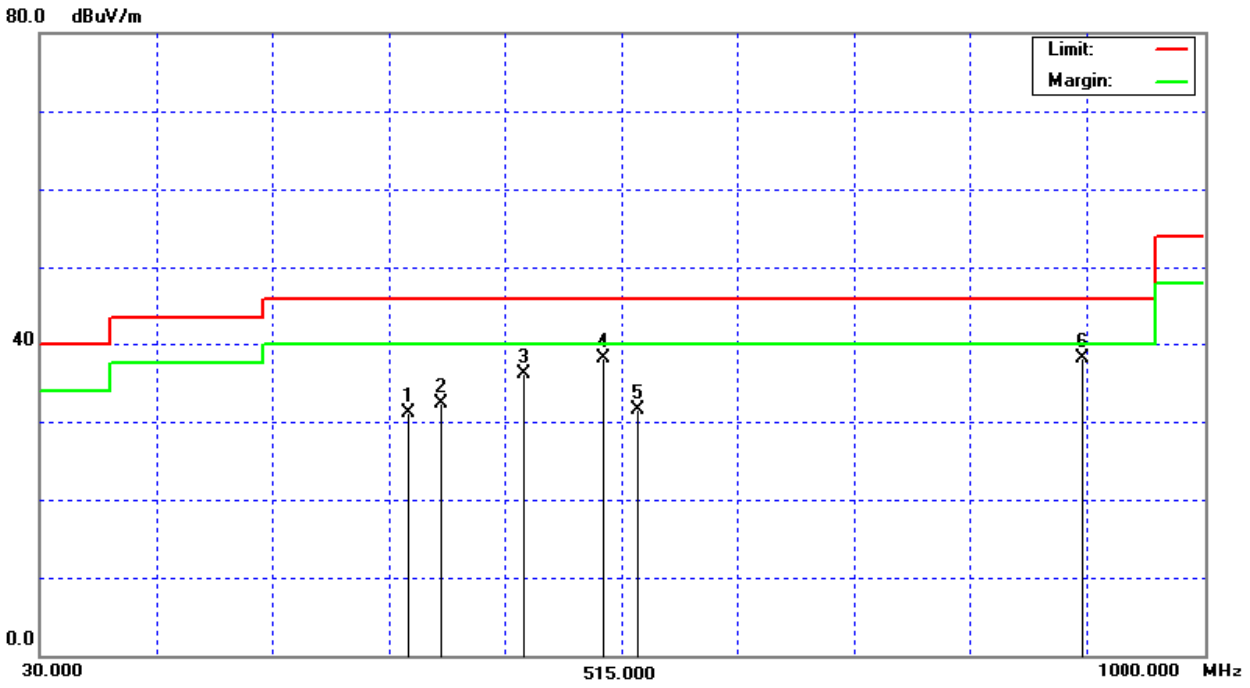
Remark：

(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 measure-ment didn't perform。

(3) Measuring frequency range from 30MHz to 1000MHz。

(4) If the peak scan value is under the limit for more than 20dB, the signal will not show in table。



4.2.8 TEST RESULTS-ABOVE 1000MHz

EUT：	2.4G RF Dongle	Model No. ：	RG-30
Temperature：	18°C	Relative Humidity：	87%
Test Power ：	AC 120V/60Hz		
Test Mode ：	CH00		

Freq.	Ant.Pol.	Reading		Ant./CF	Act.		Limit		Note
		Peak	AV		Peak	AV	Peak	AV	
(MHz)	H/V	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	
2390.00	V	23.51	13.01	32.57	56.08	45.58	74.00	54.00	X/E
2406.50	V	48.15	28.97	32.67	80.82	61.64			X/F
4813.00	V	54.69	39.82	4.53	59.22	44.35	74.00	54.00	X/H
7219.48	V	56.63	39.73	11.07	67.70	50.80	74.00	54.00	X/H

Remark：

(1) Spectrum Setting :
QP: 30MHz – 1000MHz: RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.
Peak: 1GHz- 25GHz: RBW= 1MHz, VBW= 1MHz, Sweep time = Auto
AV: 1GHz- 25GHz: RBW= 1MHz, VBW= 10Hz, Sweep time = Auto

(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 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.)

(4) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission ◦

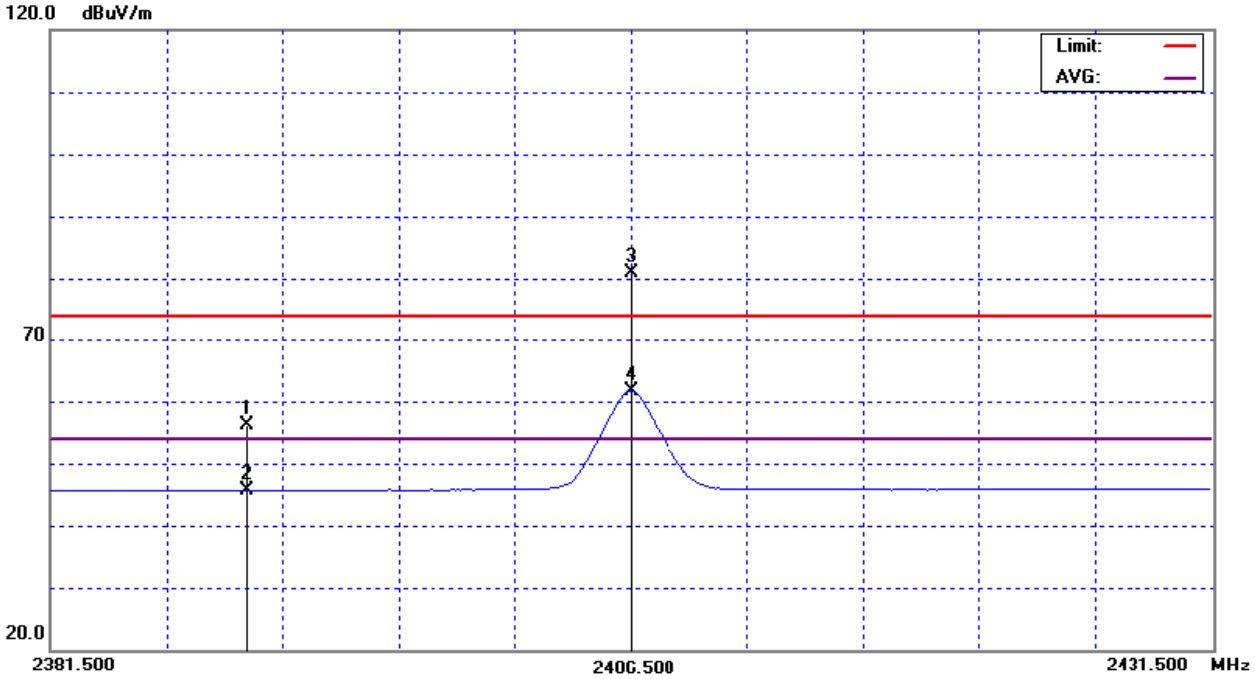
(5) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

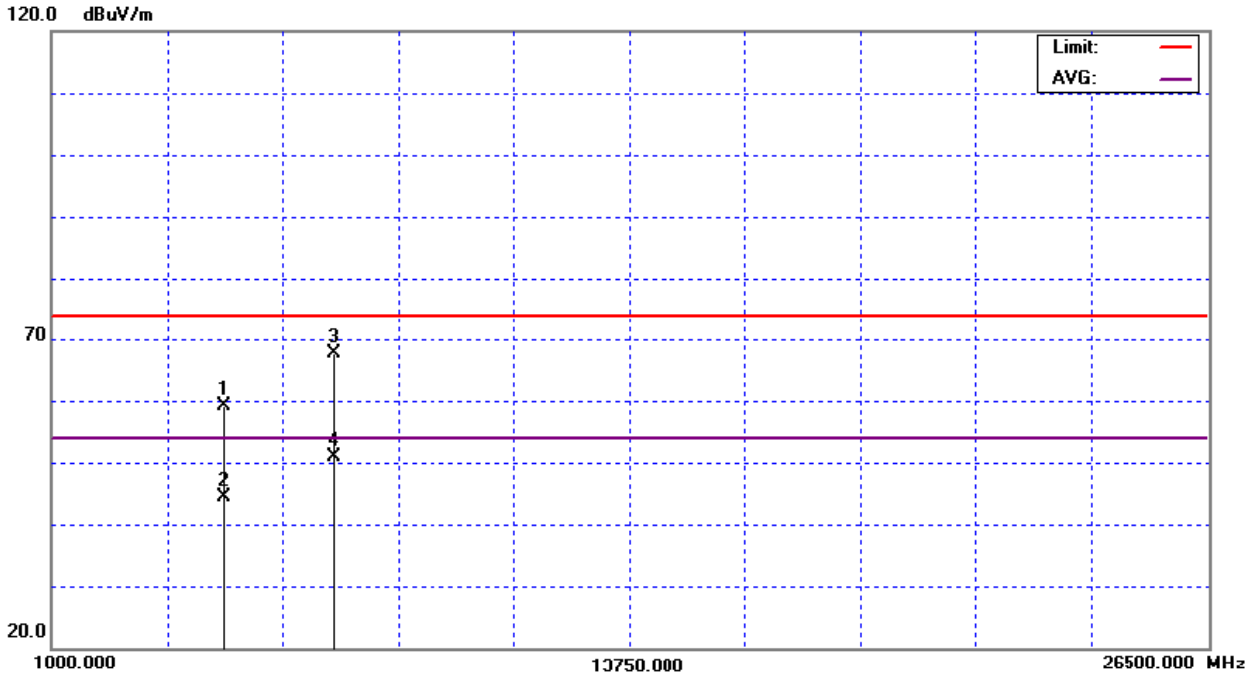
(6) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

(7) EUT Orthogonal Axes：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

(8) During the measurements above 1GHz it is taken care of that the EUT is always within the 3dB cone of radiation BW of the used antenna.

Orthogonal Axes：X
CH00 (Above 1000 MHz, Vertical)





EUT：	2.4G RF Dongle	Model No. ：	RG-30
Temperature：	18°C	Relative Humidity：	87%
Test Power ：	AC 120V/60Hz		
Test Mode ：	CH00		

Freq. (MHz)	Ant.Pol. H/V	Reading Peak (dBuV)	Reading AV (dBuV)	Ant./CF CF(dB)	Act. Peak (dBuV/m)	Act. AV (dBuV/m)	Limit Peak (dBuV/m)	Limit AV (dBuV/m)	Note
2390.00	H	24.84	13.08	32.57	57.41	45.65	74.00	54.00	X/E
2406.50	H	51.59	32.62	32.67	84.26	65.29			X/F
4813.02	H	51.83	38.12	4.53	56.36	42.65	74.00	54.00	X/H
7219.48	H	52.06	37.25	11.07	63.13	48.32	74.00	54.00	X/H

Remark：

(1) Spectrum Setting :
QP: 30MHz – 1000MHz: RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.
Peak: 1GHz- 25GHz: RBW= 1MHz, VBW= 1MHz, Sweep time = Auto
AV: 1GHz- 25GHz: RBW= 1MHz, VBW= 10Hz, Sweep time = Auto

(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 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.)

(4) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission 。

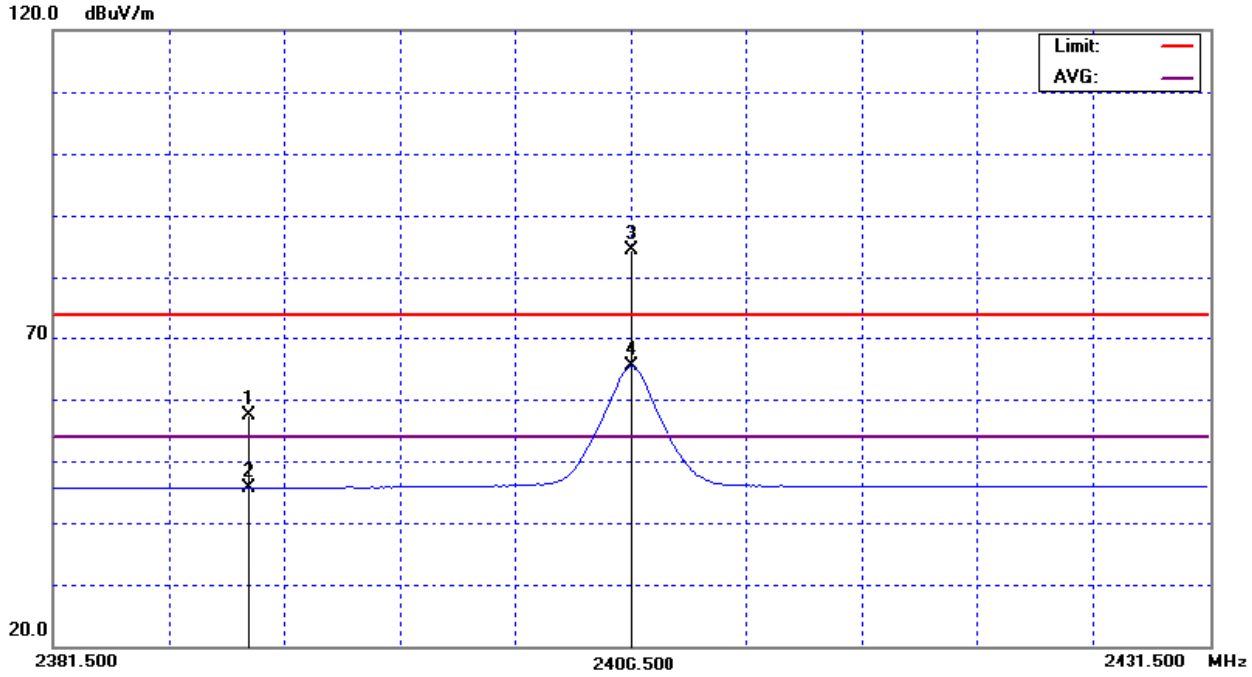
(5) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

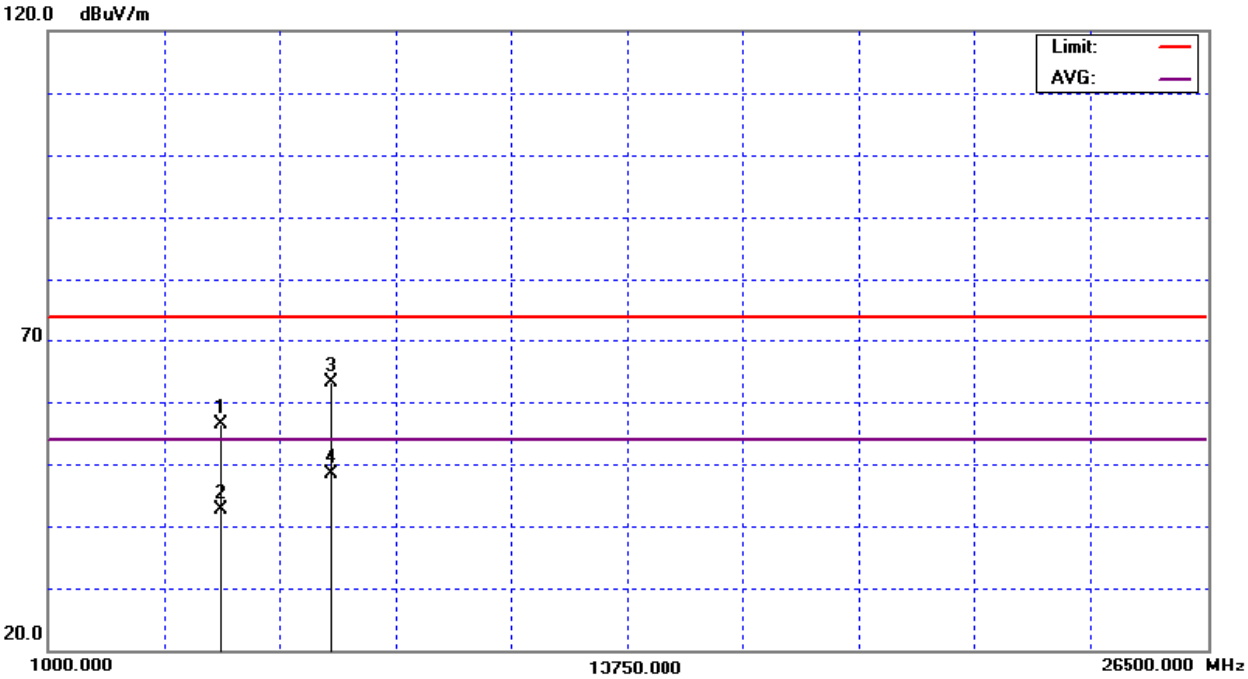
(6) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

(7) EUT Orthogonal Axes：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

(8) During the measurements above 1GHz it is taken care of that the EUT is always within the 3dB cone of radiation BW of the used antenna.

Orthogonal Axes：X
CH00 (Above 1000 MHz, Horizontal)





EUT：	2.4G RF Dongle	Model No. ：	RG-30
Temperature：	18°C	Relative Humidity：	87%
Test Power ：	AC 120V/60Hz		
Test Mode ：	CH14		

Freq.	Ant.Pol.	Reading		Ant./CF	Act.		Limit		Note
		Peak	AV		Peak	AV	Peak	AV	
(MHz)	H/V	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	
2438.50	V	49.42	31.02	32.85	82.27	63.87			X/F
4877.02	V	56.16	40.15	4.74	60.90	44.89	74.00	54.00	X/H
7315.44	V	56.72	39.40	11.37	68.09	50.77	74.00	54.00	X/H

Remark：

(1) Spectrum Setting :
QP: 30MHz – 1000MHz: RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.
Peak: 1GHz- 25GHz: RBW= 1MHz, VBW= 1MHz, Sweep time = Auto
AV: 1GHz- 25GHz: RBW= 1MHz, VBW= 10Hz, Sweep time = Auto

(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 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.)

(4) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission 。

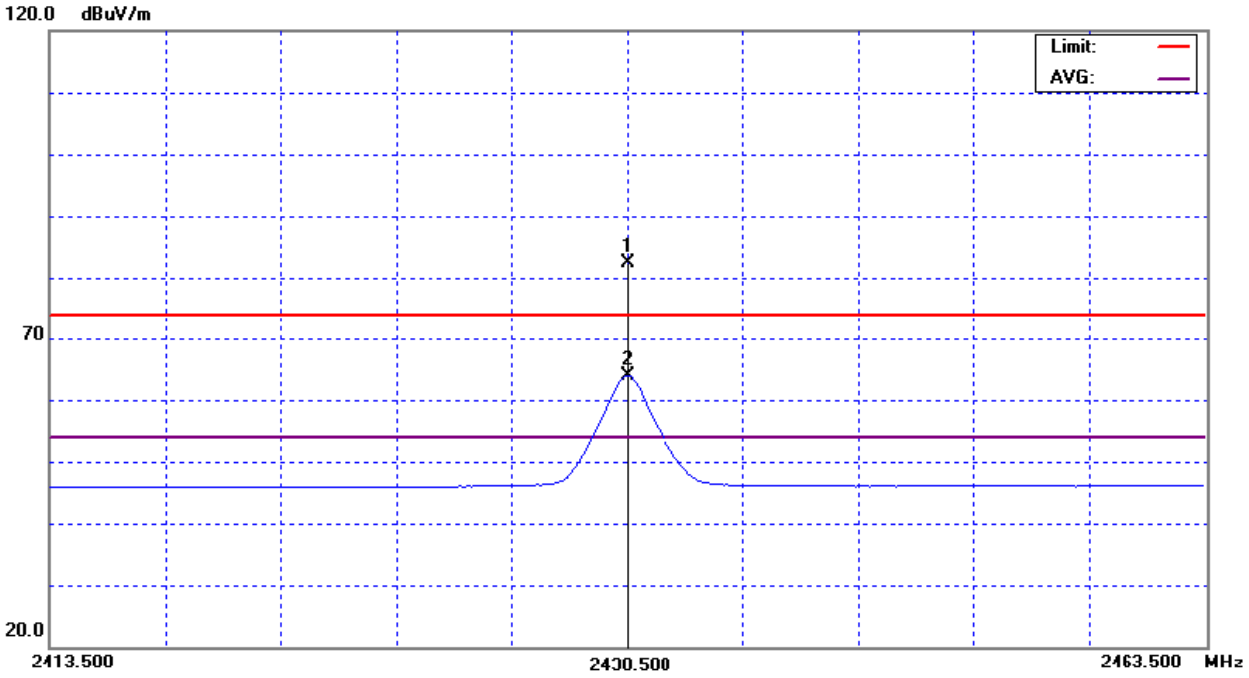
(5) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

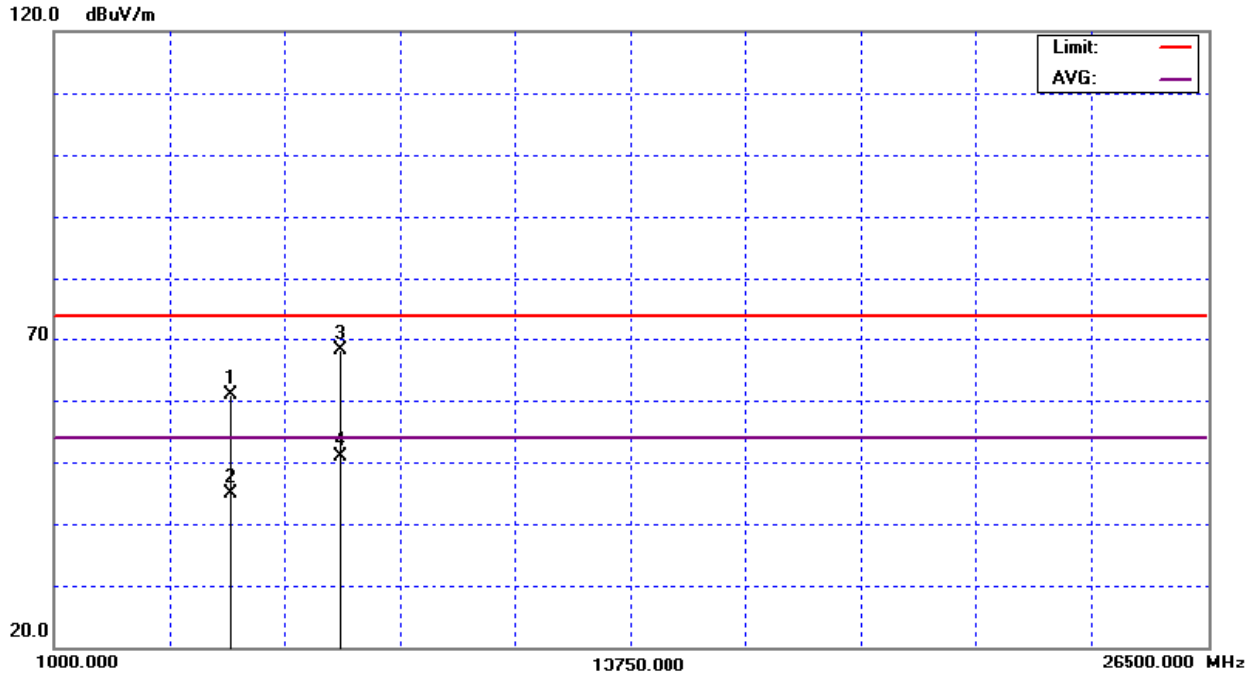
(6) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

(7) EUT Orthogonal Axes：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

(8) During the measurements above 1GHz it is taken care of that the EUT is always within the 3dB cone of radiation BW of the used antenna.

Orthogonal Axes：X
CH14(Above 1000 MHz, Vertical)





EUT：	2.4G RF Dongle	Model No. ：	RG-30
Temperature：	18°C	Relative Humidity：	87%
Test Power ：	AC 120V/60Hz		
Test Mode ：	CH14		

Freq.	Ant.Pol.	Reading		Ant./CF	Act.		Limit		Note
		Peak	AV		Peak	AV	Peak	AV	
(MHz)	H/V	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	
2438.50	H	49.07	31.53	32.85	81.92	64.38			X/F
4876.94	H	52.86	39.31	4.74	57.60	44.05	74.00	54.00	X/H
7315.58	H	53.24	37.89	11.37	64.61	49.26	74.00	54.00	X/H

Remark：

(1) Spectrum Setting :
QP: 30MHz – 1000MHz: RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.
Peak: 1GHz- 25GHz: RBW= 1MHz, VBW= 1MHz, Sweep time = Auto
AV: 1GHz- 25GHz: RBW= 1MHz, VBW= 10Hz, Sweep time = Auto

(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 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.)

(4) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission 。

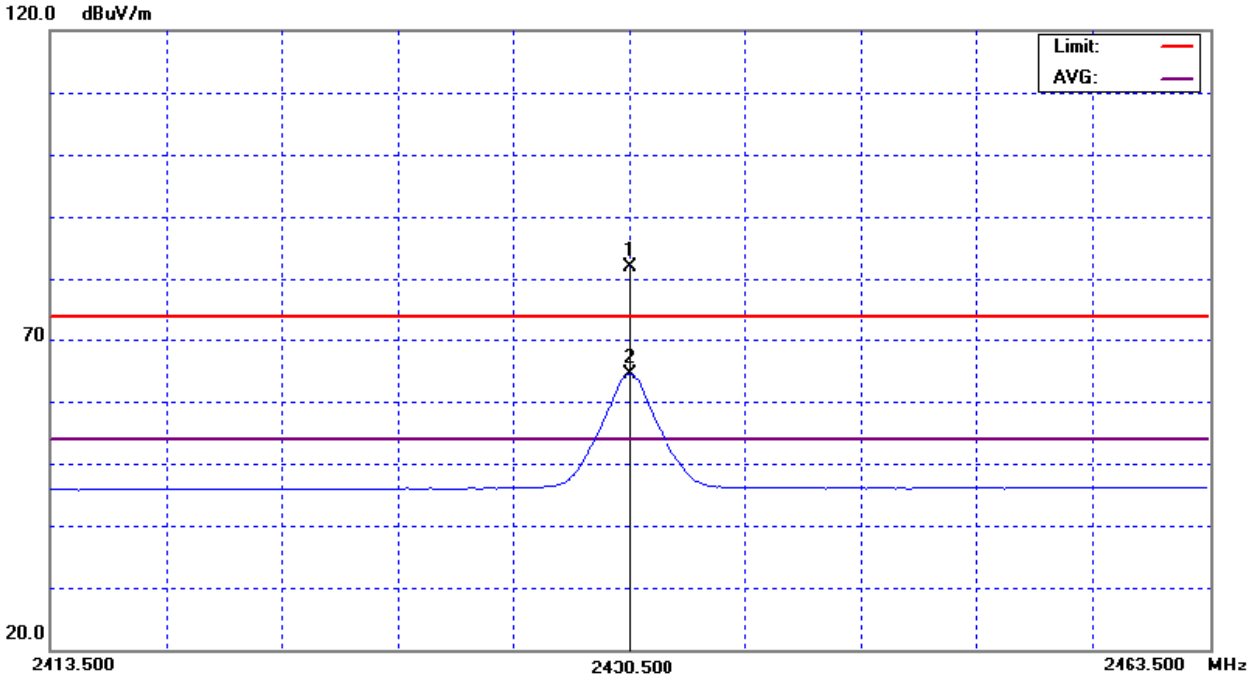
(5) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

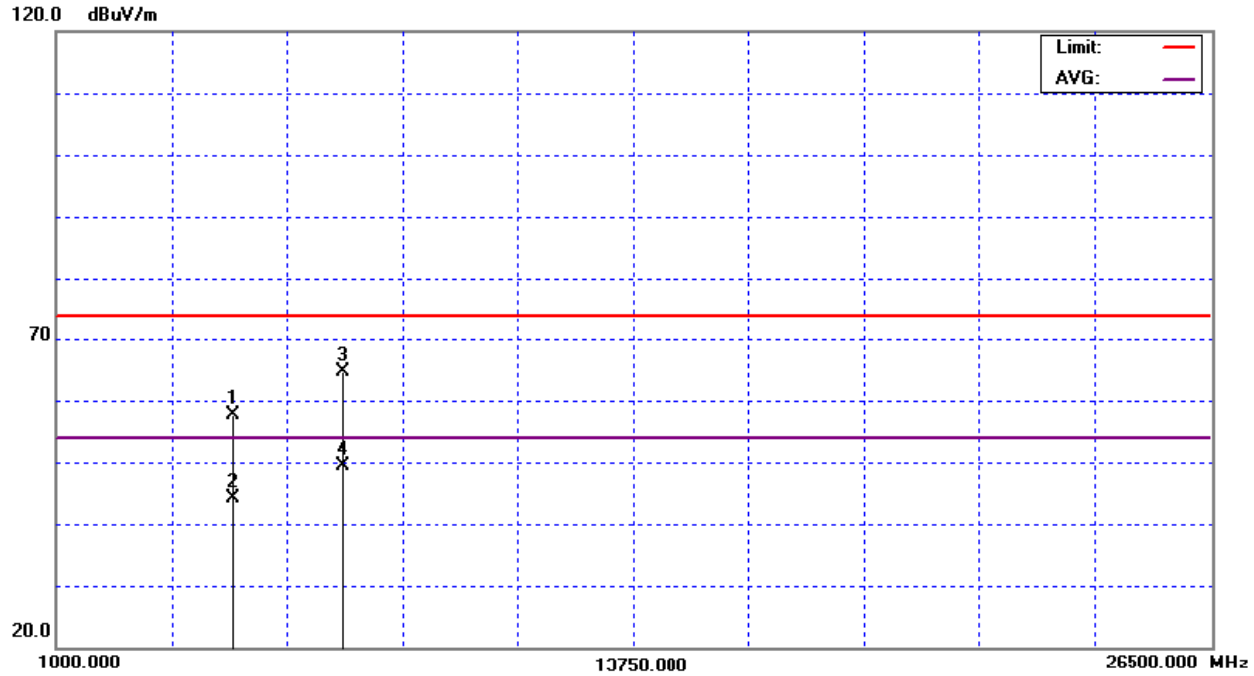
(6) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

(7) EUT Orthogonal Axes：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

(8) During the measurements above 1GHz it is taken care of that the EUT is always within the 3dB cone of radiation BW of the used antenna.

Orthogonal Axes：X
CH14(Above 1000 MHz, Horizontal)





EUT：	2.4G RF Dongle	Model No. ：	RG-30
Temperature：	18°C	Relative Humidity：	87%
Test Power ：	AC 120V/60Hz		
Test Mode ：	CH28		

Freq.	Ant.Pol.	Reading		Ant./CF	Act.		Limit		Note
		Peak	AV		Peak	AV	Peak	AV	
(MHz)	H/V	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	
2472.50	V	49.61	31.96	33.04	82.65	65.00			X/F
2483.50	V	24.41	13.07	33.10	57.51	46.17	74.00	54.00	X/E
4944.96	V	56.93	40.23	4.96	61.89	45.19	74.00	54.00	X/H
7417.54	V	54.83	38.29	11.69	66.52	49.98	74.00	54.00	X/H

Remark：

(1) Spectrum Setting :
QP: 30MHz – 1000MHz: RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.
Peak: 1GHz- 25GHz: RBW= 1MHz, VBW= 1MHz, Sweep time = Auto
AV: 1GHz- 25GHz: RBW= 1MHz, VBW= 10Hz, Sweep time = Auto

(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 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.)

(4) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission 。

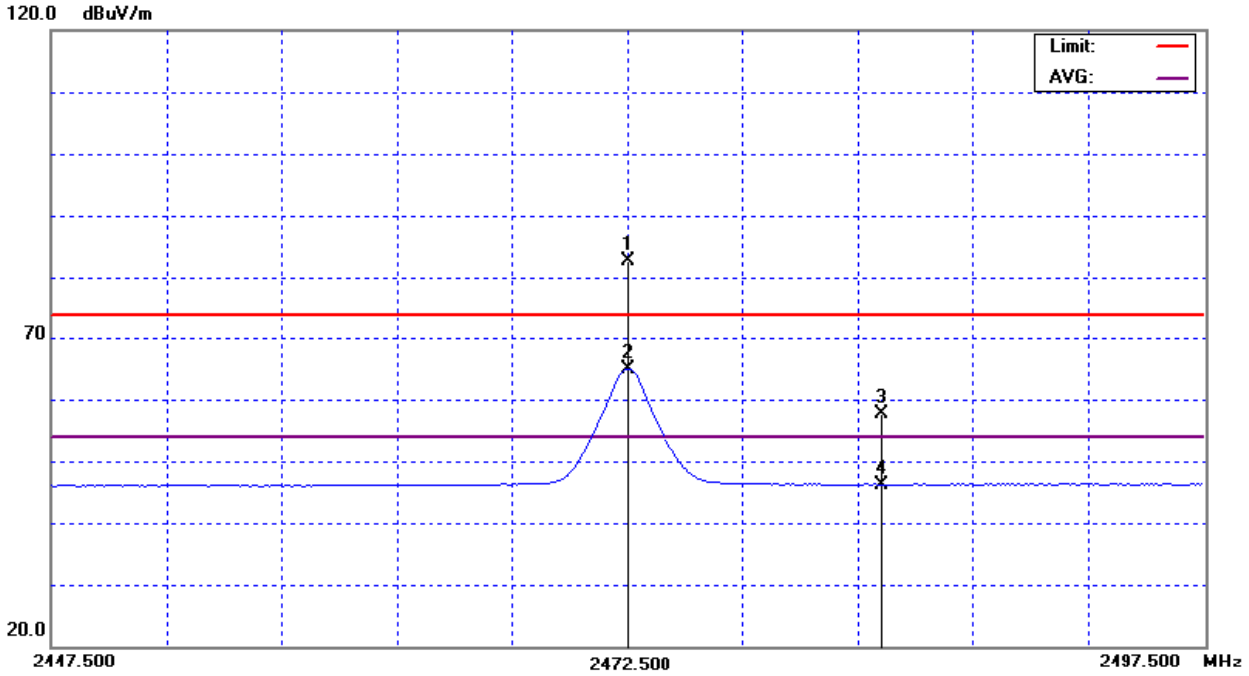
(5) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

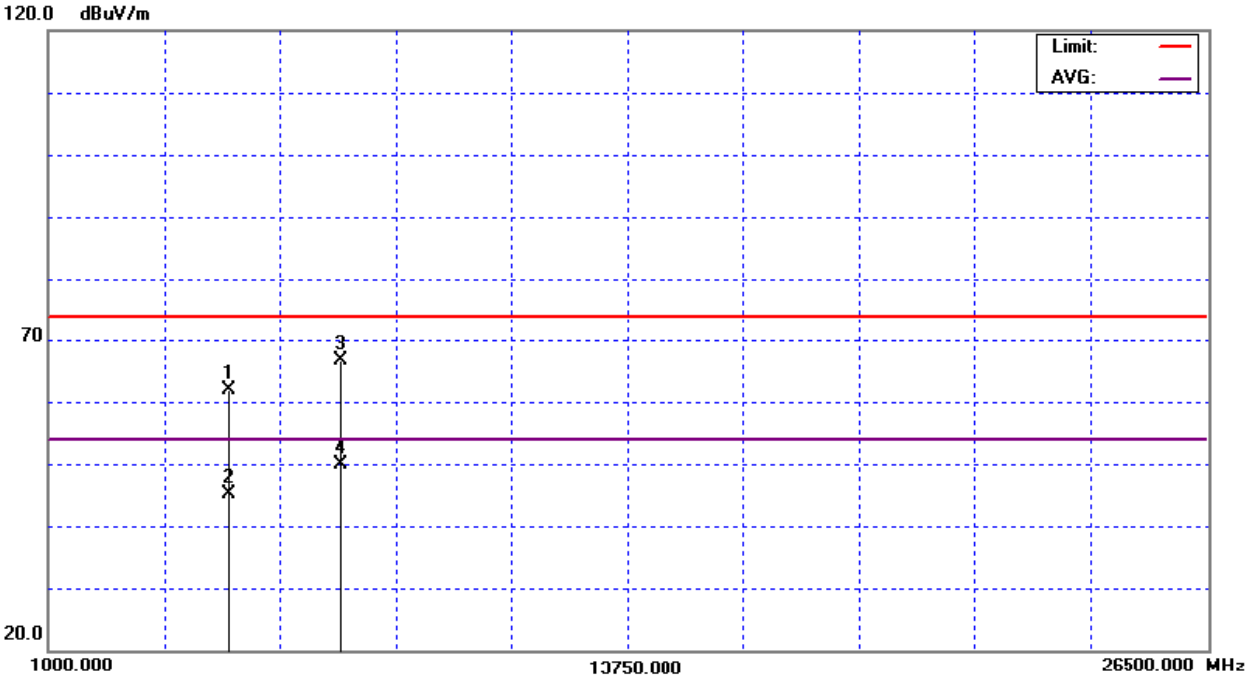
(6) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

(7) EUT Orthogonal Axes：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

(8) During the measurements above 1GHz it is taken care of that the EUT is always within the 3dB cone of radiation BW of the used antenna.

Orthogonal Axes：X
CH28 (Above 1000 MHz, Vertical)





EUT：	2.4G RF Dongle	Model No. ：	RG-30
Temperature：	18°C	Relative Humidity：	87%
Test Power ：	AC 120V/60Hz		
Test Mode ：	CH28		

Freq.	Ant.Pol.	Reading		Ant./CF	Act.		Limit		Note
		Peak	AV		Peak	AV	Peak	AV	
(MHz)	H/V	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	
2472.50	H	49.32	31.81	33.04	82.36	64.85			X/F
2483.50	H	24.29	13.07	33.10	57.39	46.17	74.00	54.00	X/E
4945.02	H	54.93	39.23	4.96	59.89	44.19	74.00	54.00	X/H
7417.60	H	51.83	36.28	11.69	63.52	47.97	74.00	54.00	X/H

Remark：

(1) Spectrum Setting :
QP: 30MHz – 1000MHz: RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.
Peak: 1GHz- 25GHz: RBW= 1MHz, VBW= 1MHz, Sweep time = Auto
AV: 1GHz- 25GHz: RBW= 1MHz, VBW= 10Hz, Sweep time = Auto

(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 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.)

(4) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission 。

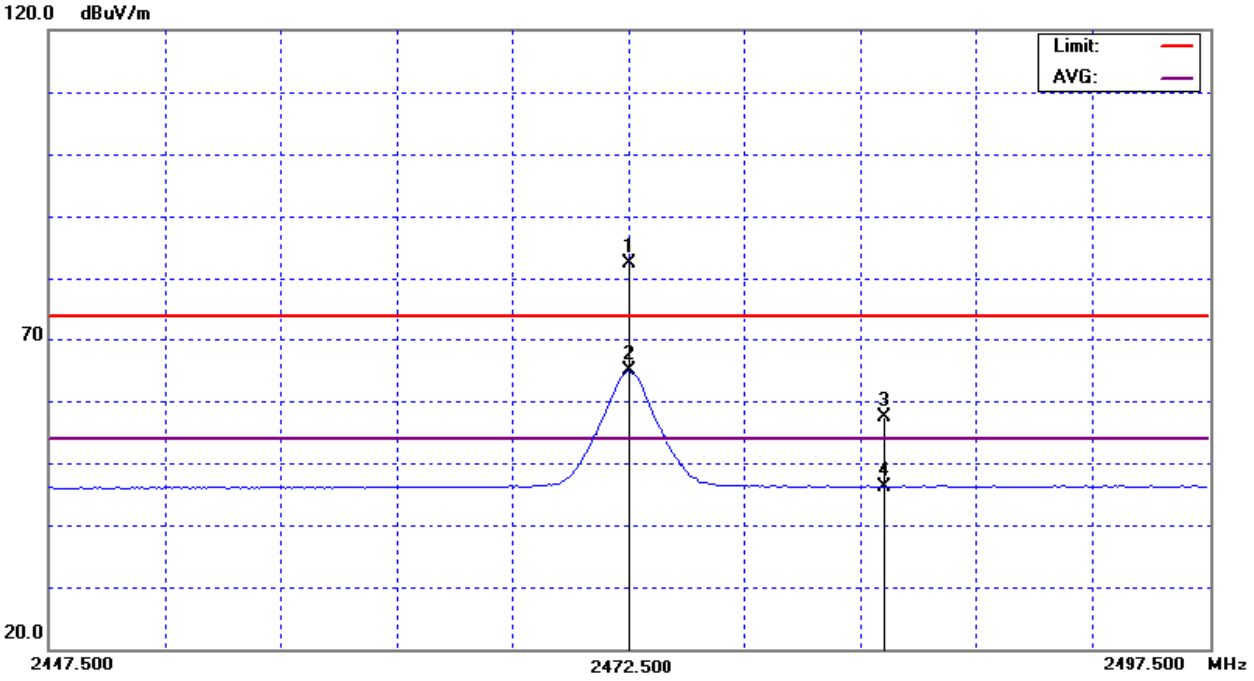
(5) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

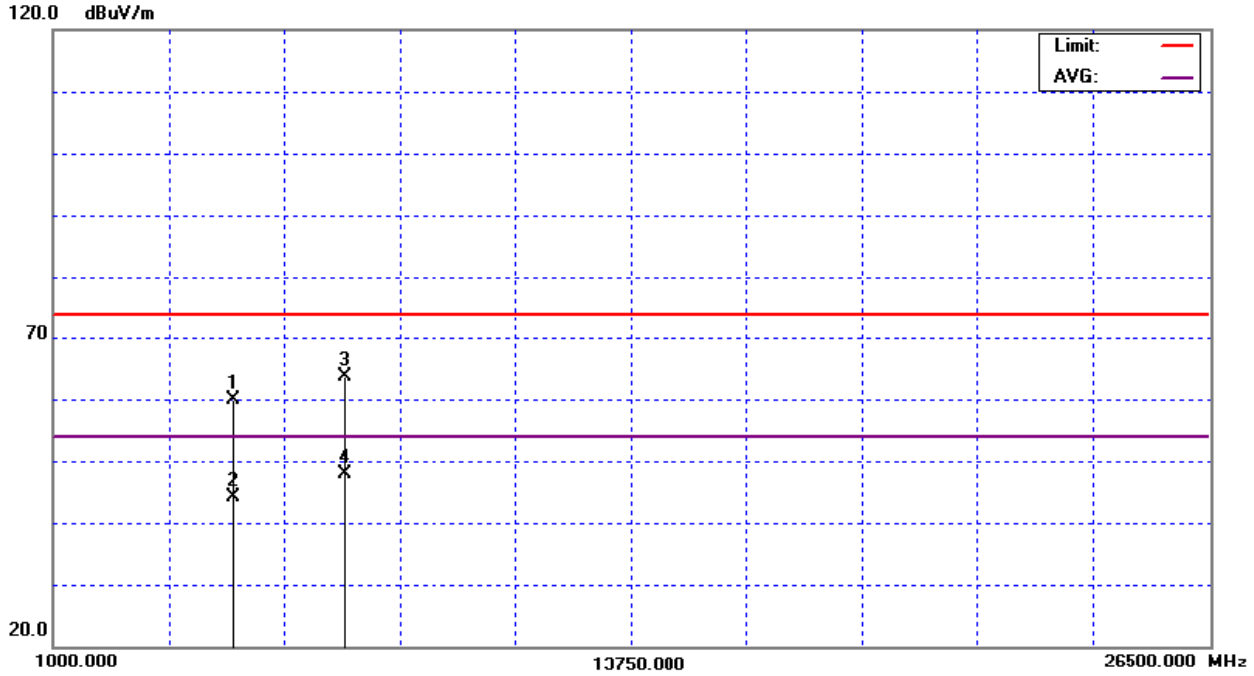
(6) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

(7) EUT Orthogonal Axes：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

(8) During the measurements above 1GHz it is taken care of that the EUT is always within the 3dB cone of radiation BW of the used antenna.

Orthogonal Axes：X
CH28 (Above 1000 MHz, Horizontal)





4.2.9 TEST RESULTS-RESTRICTED BANDS REQUIREMENTS

EUT：	2.4G RF Dongle	Model No. ：	RG-30
Temperature：	18°C	Relative Humidity：	87%
Test Power ：	AC 120V/60Hz		
Test Mode ：	TX CH 2406.5MHz/2472.5MHz(Vertical)		
Note：	The emission of the carrier radiated field strength is measured for (Peak and AV) as following: 1. The transmitter was then configured with the worst case antenna and setup to transmit at the lowest channel (CH00). Then the field strength was measured at 2310-2390 MHz. 2. The transmitter was configured with the worst case antenna and setup to transmit at the highest channel (CH28). Then the field strength was measured at 2483.5-2500 MHz.		

Freq.	Ant.Pol.	Reading		Ant./CF	Act.		Limit		Note
		Peak	AV		Peak	AV	Peak	AV	
(MHz)	H/V	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	
2390.00	V	23.51	13.01	32.57	56.08	45.58	74.00	54.00	CH00
2483.50	V	24.41	13.07	33.10	57.51	46.17	74.00	54.00	CH28

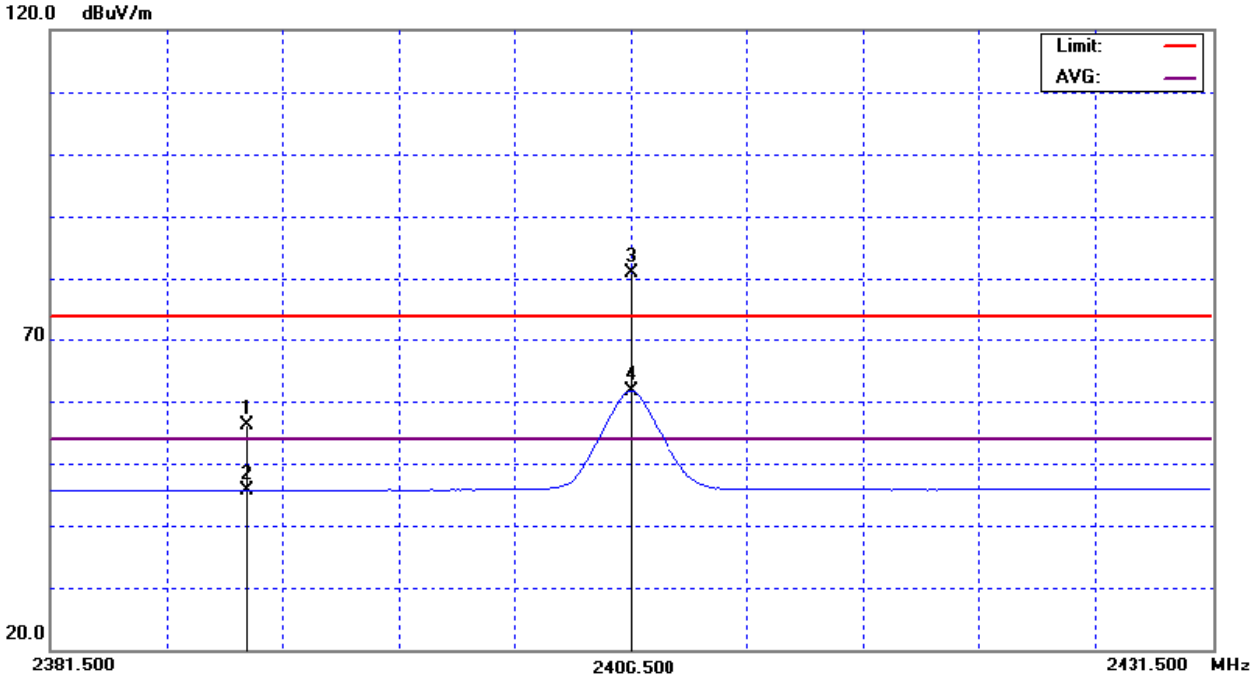
Remark：

(1) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission ◦

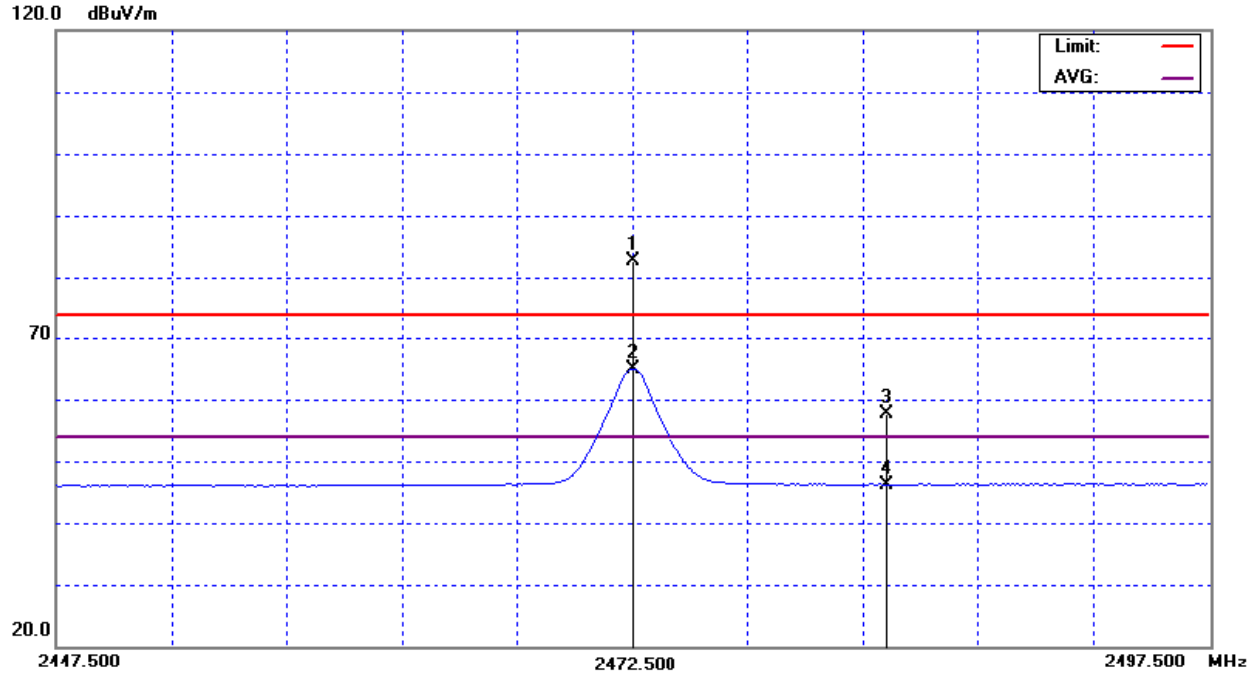
(2) EUT Orthogonal Axes：

"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

TX CH00 (Restricted Bands Requirements, Vertical)



TX CH28 (Restricted Bands Requirements, Vertical)



EUT：	2.4G RF Dongle	Model No. ：	RG-30
Temperature：	18°C	Relative Humidity：	87%
Test Power ：	AC 120V/60Hz		
Test Mode ：	TX CH 2406.5MHz/2472.5MHz (Horizontal)		
Note：	The emission of the carrier radiated field strength is measured for (Peak and AV) as following: 1. The transmitter was then configured with the worst case antenna and setup to transmit at the lowest channel (CH00). Then the field strength was measured at 2310-2390 MHz. 2. The transmitter was configured with the worst case antenna and setup to transmit at the highest channel (CH28). Then the field strength was measured at 2483.5-2500 MHz.		

Freq.	Ant.Pol.	Reading		Ant./CF	Act.		Limit		Note
		Peak	AV		Peak	AV	Peak	AV	
(MHz)	H/V	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	
2390.00	H	24.84	13.08	32.57	57.41	45.65	74.00	54.00	CH00
2483.50	H	24.29	13.07	33.10	57.39	46.17	74.00	54.00	CH28

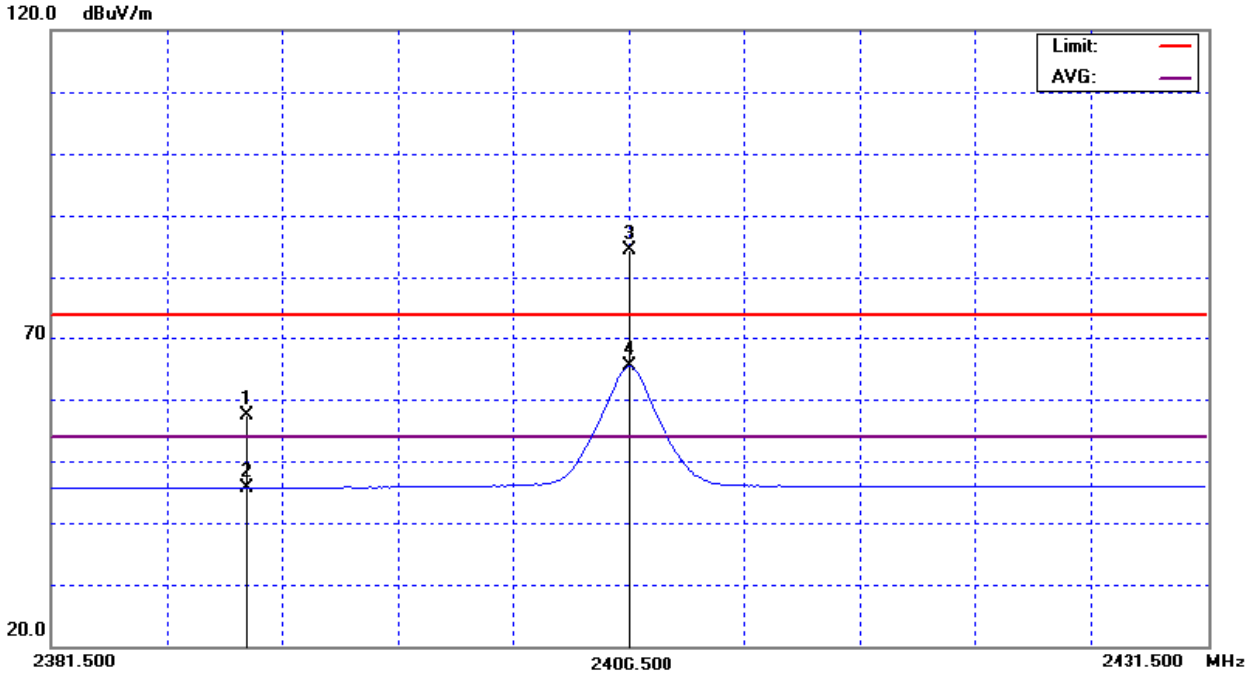
Remark：

(1) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission ◦

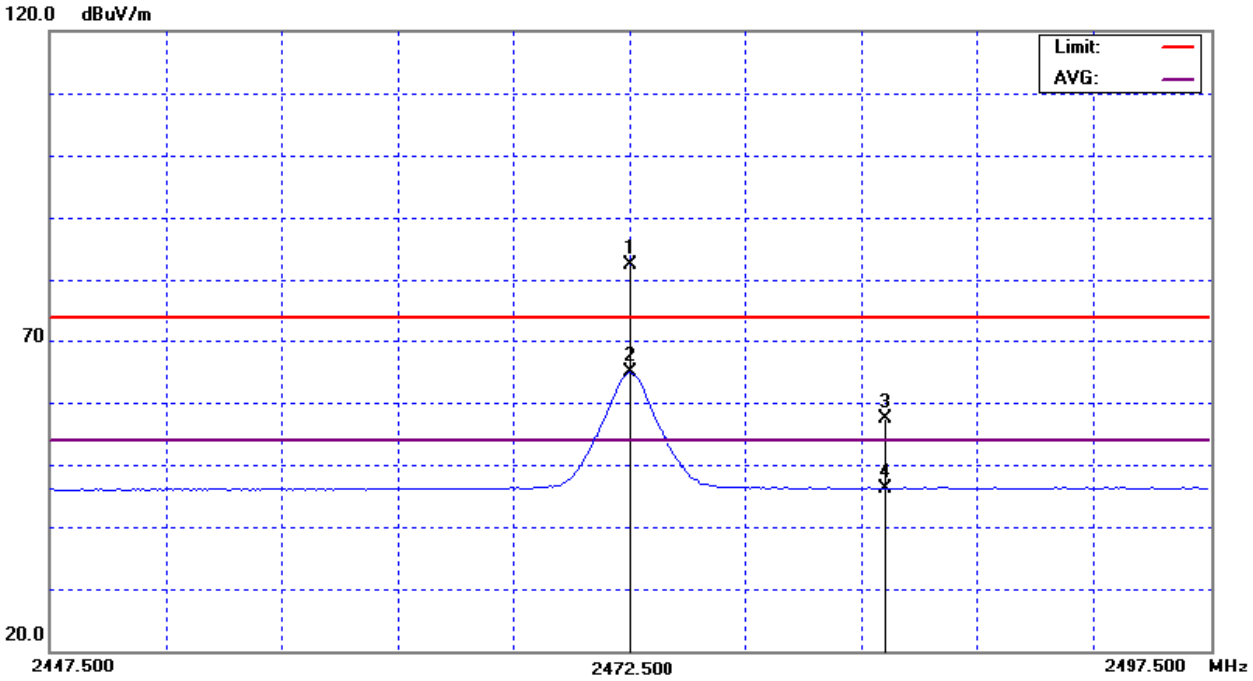
(2) EUT Orthogonal Axes：

"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

TX CH00 (Restricted Bands Requirements, Horizontal)



TX CH28 (Restricted Bands Requirements, Horizontal)



5. BANDWIDTH TEST

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart C			
Test Item	Limit	Frequency Range (MHz)	Result
Bandwidth	>= 500KHz (6dB bandwidth)	2400-2483.5	PASS

5.1.1 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-30	100854	Apr. 14, 2009

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

5.1.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 100KHz, VBW=100KHz, Sweep time = Auto.

5.1.3 DEVIATION FROM STANDARD

No deviation.

5.1.4 TEST SETUP

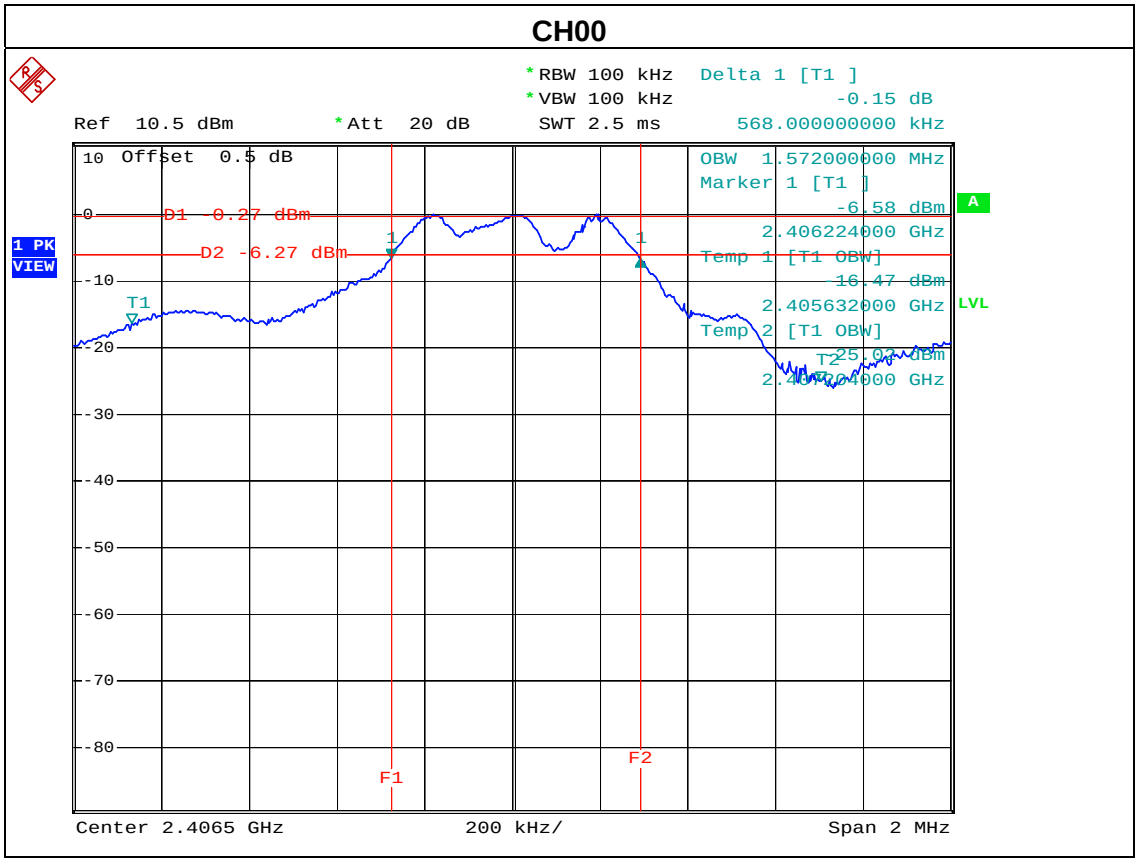
5.1.5 EUT OPERATION CONDITIONS

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.

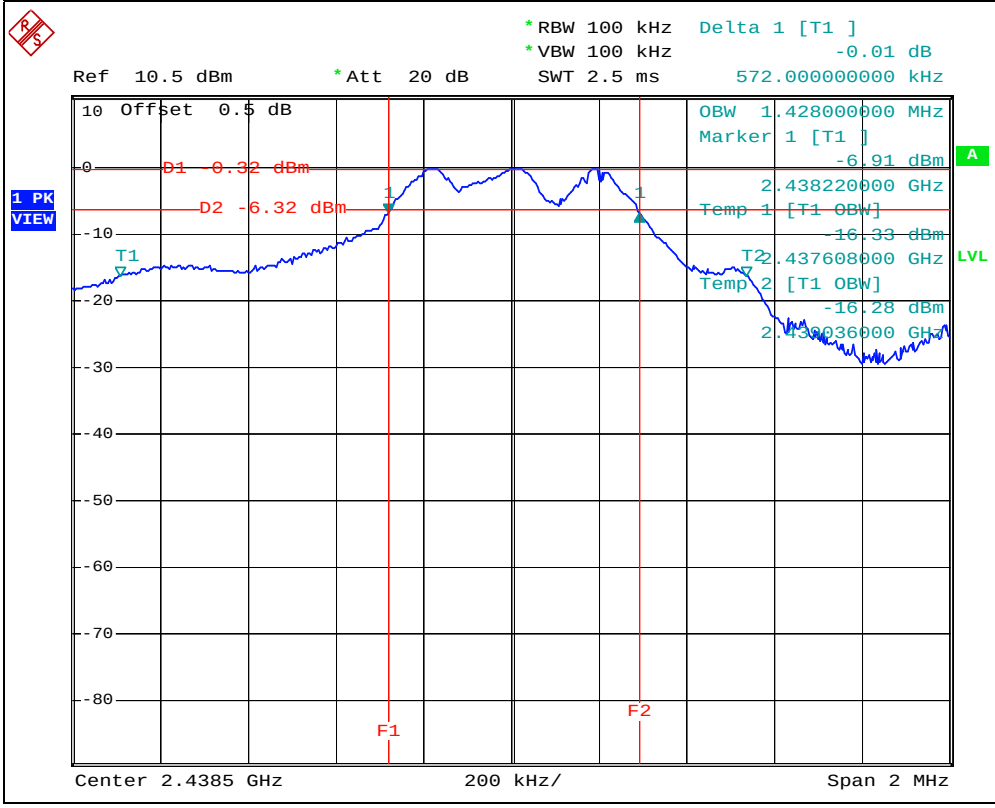
5.1.6 TEST RESULTS

EUT：	2.4G RF Dongle	Model No. ：	RG-30
Temperature：	29°C	Relative Humidity：	76%
Test Power ：	AC 120V/60Hz		
Test Mode ：	CH00/CH14/CH28		

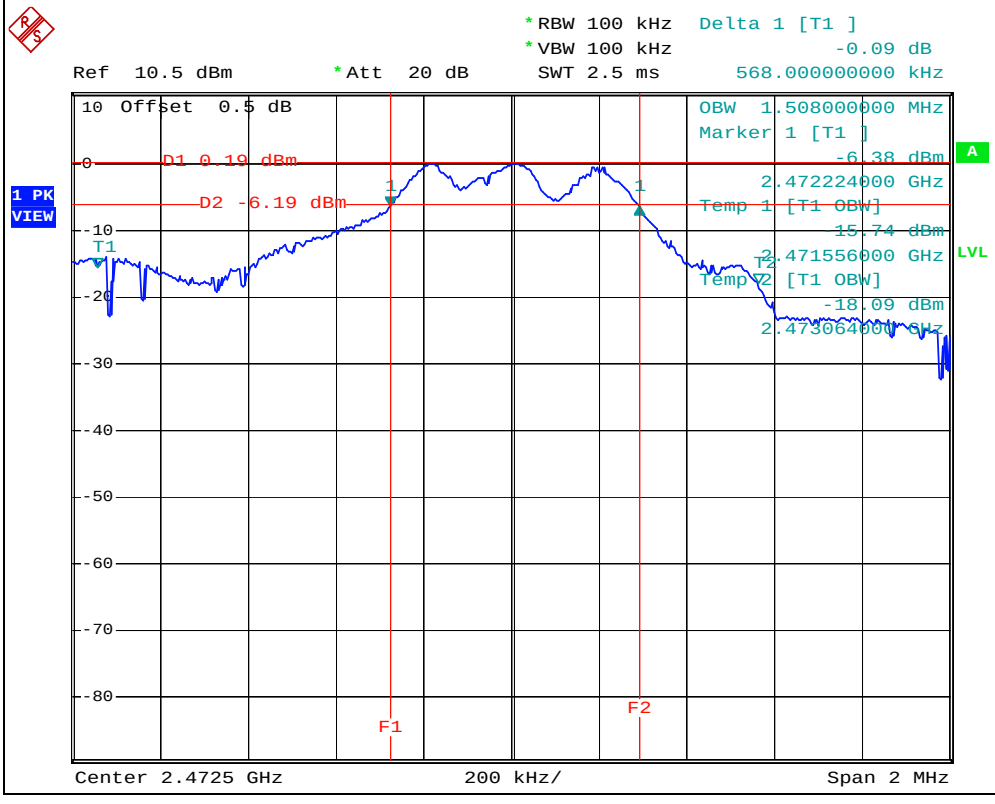
Test Channel	Frequency (MHz)	Bandwidth (MHz)	99% Occupied BW (MHz)	LIMIT (MHz)
CH00	2406.5	0.57	1.57	>=500KHz
CH14	2438.5	0.57	1.43	>=500KHz
CH28	2472.5	0.57	1.51	>=500KHz



CH14


*RBW 100 kHz
*VBW 100 kHz
Ref 10.5 dBm
*Att 20 dB
SWT 2.5 ms
Delta 1 [T1]
-0.01 dB
572.000000000 kHz
10 Offset 0.5 dB
D1 -0.32 dBm
D2 -6.32 dBm
OBW 1.428000000 MHz
Marker 1 [T1]
-6.91 dBm
2.438220000 GHz
Temp 1 [T1 OBW]
-16.33 dBm
2.437608000 GHz
Temp 2 [T1 OBW]
-16.28 dBm
2.439036000 GHz
1 PK VIEW
A
LVL
T1
T2
F1
F2
Center 2.4385 GHz
200 kHz/
Span 2 MHz

CH28


*RBW 100 kHz
*VBW 100 kHz
Ref 10.5 dBm
*Att 20 dB
SWT 2.5 ms
Delta 1 [T1]
-0.09 dB
568.000000000 kHz
10 Offset 0.5 dB
D1 0.19 dBm
D2 -6.19 dBm
OBW 1.508000000 MHz
Marker 1 [T1]
-6.38 dBm
2.472224000 GHz
Temp 1 [T1 OBW]
-15.74 dBm
2.471556000 GHz
Temp 2 [T1 OBW]
-18.09 dBm
2.473064000 GHz
1 PK VIEW
A
LVL
T1
T2
F1
F2
Center 2.4725 GHz
200 kHz/
Span 2 MHz

6. PEAK OUTPUT POWER TEST

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart C			
Test Item	Limit	Frequency Range (MHz)	Result
Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

6.1.1 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Power Meter	Anritsu	ML2487A	6K00004714	Feb. 10, 2010
2	Power Meter Sensor	Anritsu	MA2491A	34138	Feb. 10, 2010

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

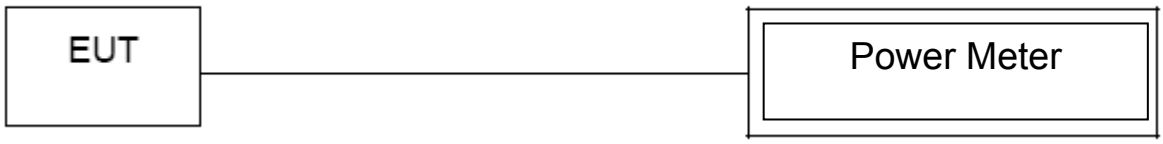
6.1.2 TEST PROCEDURE

The EUT was directly connected to the power meter and antenna output port as show in the block diagram below,

6.1.3 DEVIATION FROM STANDARD

No deviation.

6.1.4 TEST SETUP



6.1.5 EUT OPERATION 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.

6.1.6 TEST RESULTS

EUT：	2.4G RF Dongle	Model No. ：	RG-30
Temperature：	29°C	Relative Humidity：	76%
Test Power ：	AC 120V/60Hz		
Test Mode ：	CH00/CH14/CH28		

Test Channel	Frequency (MHz)	Peak Output Power (dBm)	LIMIT (dBm)	LIMIT (W)
CH00	2406.5	0.23	30	1
CH14	2438.5	0.11	30	1
CH28	2472.5	0.17	30	1

7. ANTENNA CONDUCTED SPURIOUS EMISSION

7.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart C			
Test Item	Limit	Frequency Range (MHz)	Result
Antenna conducted Spurious Emission	20dB less than the peak value of fundamental frequency	30-25000	PASS

7.1.1 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-30	100854	Apr. 14, 2009

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

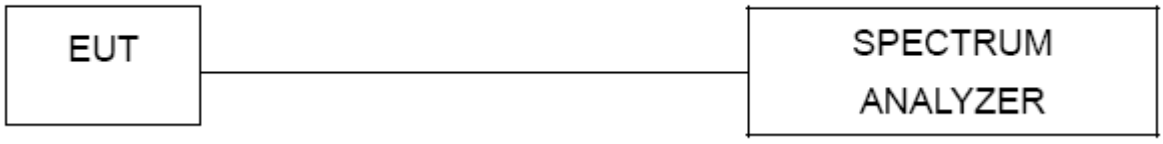
7.1.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 100KHz, VBW=100KHz, Sweep time = Auto.

7.1.3 DEVIATION FROM STANDARD

No deviation.

7.1.4 TEST SETUP



7.1.5 EUT OPERATION CONDITIONS

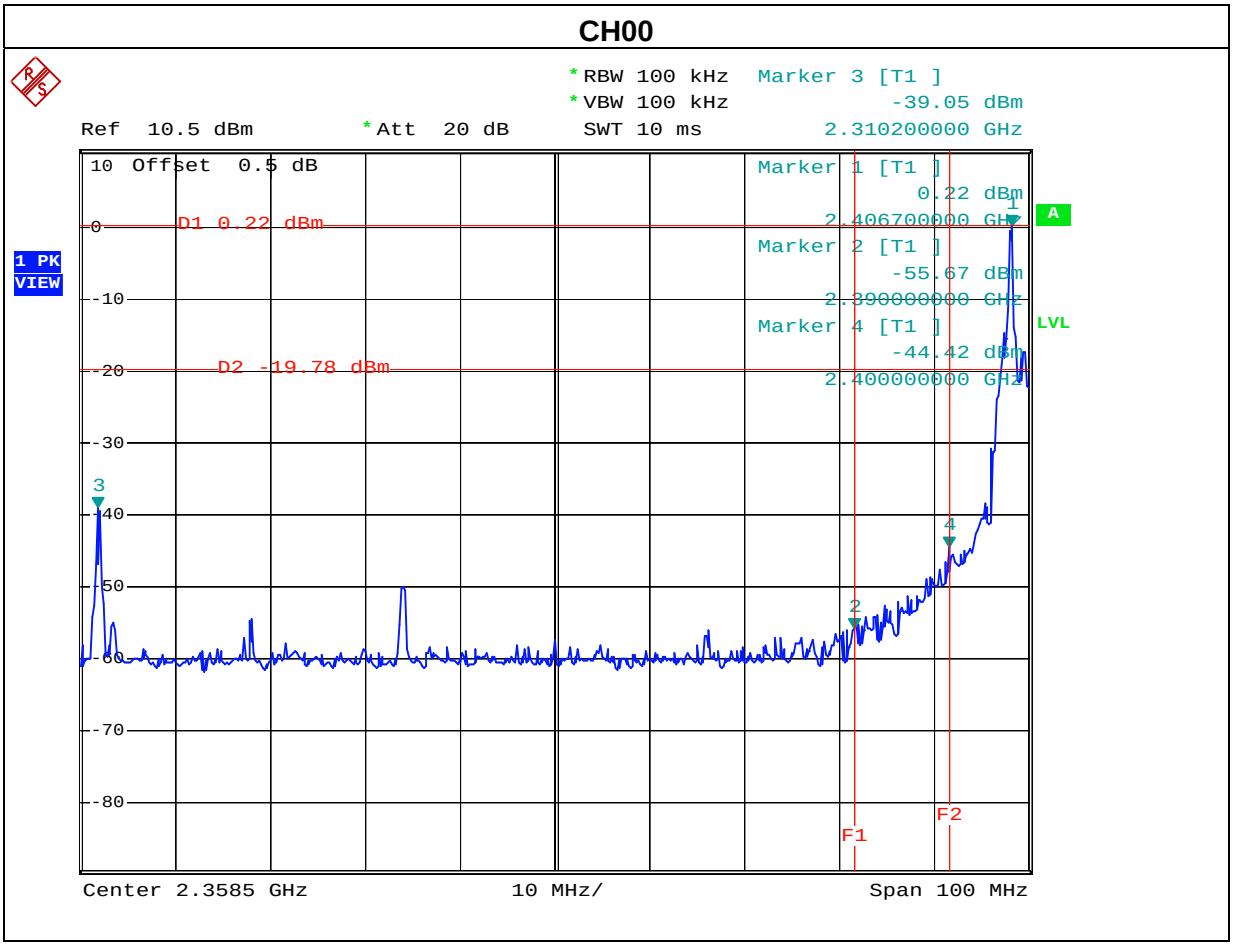
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

7.1.6 TEST RESULTS

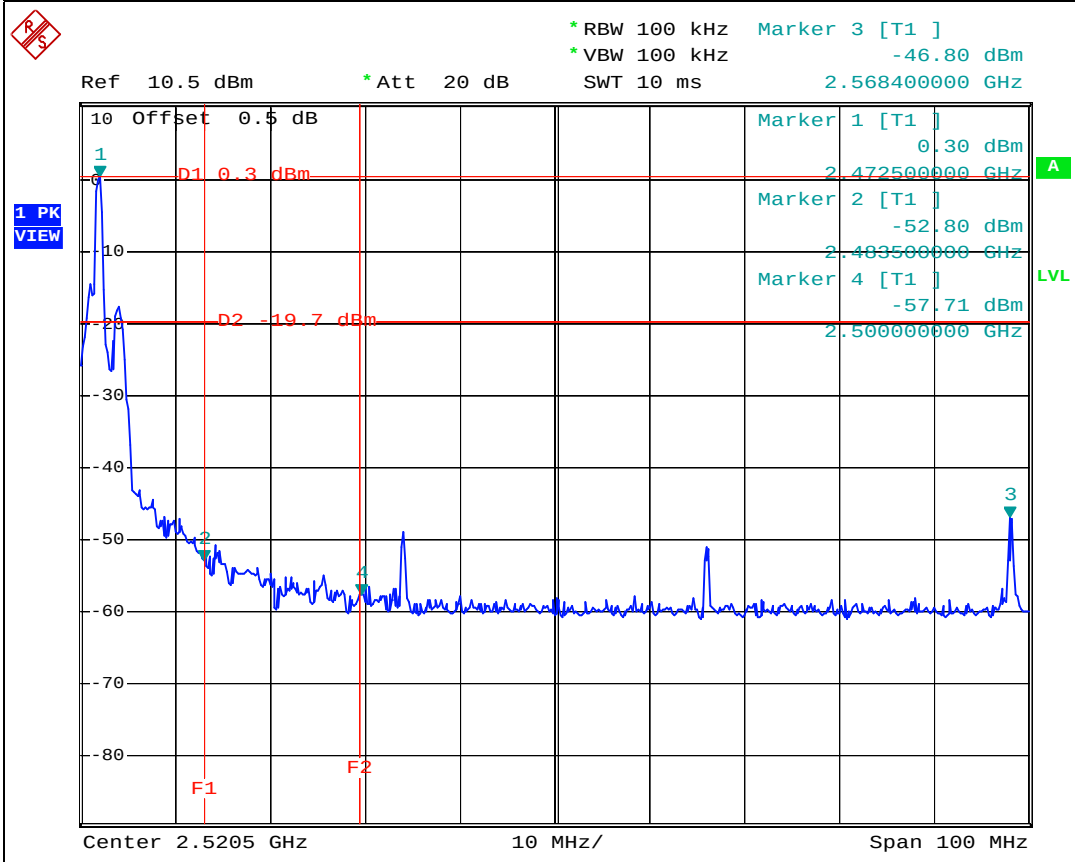
EUT：	2.4G RF Dongle	Model No. ：	RG-30
Temperature：	29°C	Relative Humidity：	76%
Test Power ：	AC 120V/60Hz		
Test Mode ：	CH00/CH28		

Channel of Worst Data: CH00,CH28			
The max. radio frequency power in any 100kHz bandwidth outside the frequency band		The max. radio frequency power in any 100 kHz bandwidth within the frequency band.	
FREQUENCY(MHz)	POWER(dBm)	FREQUENCY(MHz)	POWER(dBm)
2310.2	-39.05	2568.4	-46.80
Result			
In any 100kHz bandwidth outside the frequency band, the radio frequency power is at least 20dB below that in the 100kHz bandwidth within the band that contains the highest lever of the desired power.			

CH00



CH28


*RBW 100 kHz
*VBW 100 kHz
Ref 10.5 dBm
*Att 20 dB
SWT 10 ms
Marker 3 [T1]
-46.80 dBm
2.568400000 GHz
10 Offset 0.5 dB
Marker 1 [T1]
0.30 dBm
2.472500000 GHz
Marker 2 [T1]
-52.80 dBm
2.483500000 GHz
Marker 4 [T1]
-57.71 dBm
2.500000000 GHz
D1 0.3 dBm
D2 -19.7 dBm
1 PK
VIEW
A
LVL
F1
F2
Center 2.5205 GHz
10 MHz/
Span 100 MHz

8. POWER SPECTRAL DENSITY TEST

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart C			
Test Item	Limit	Frequency Range (MHz)	Result
Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

8.1.1 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-30	100854	Apr. 14, 2009

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

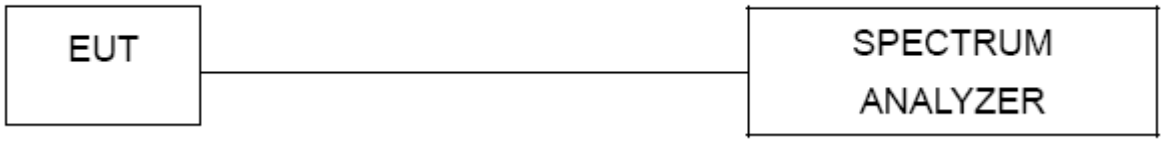
8.1.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW=3KHz, VBW=30KHz, Sweep time = 500s.

8.1.3 DEVIATION FROM STANDARD

No deviation.

8.1.4 TEST SETUP



8.1.5 EUT OPERATION CONDITIONS

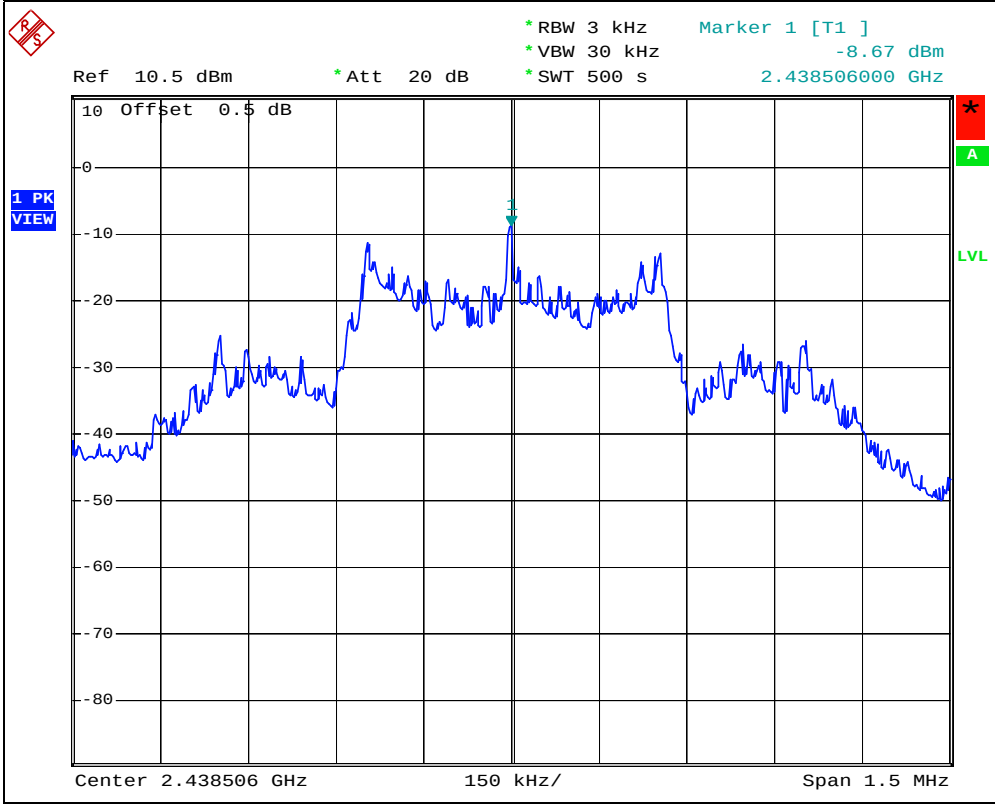
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

8.1.6 TEST RESULTS

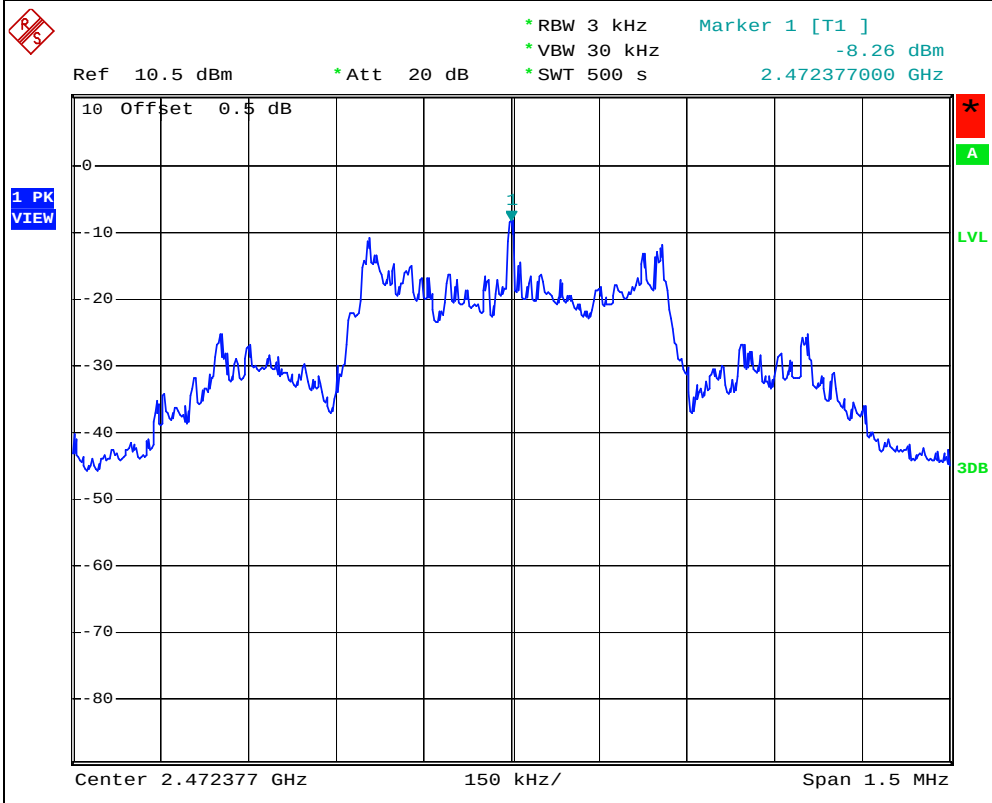
EUT：	2.4G RF Dongle	Model No. ：	RG-30
Temperature：	29°C	Relative Humidity：	76%
Test Power ：	AC 120V/60Hz		
Test Mode ：	CH00/CH14/CH28		

Test Channel	Frequency (MHz)	Power Density (dBm)	LIMIT (dBm)
CH00	2406.5	-8.74	8
CH14	2438.5	-8.67	8
CH28	2472.5	-8.26	8

CH14


*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-8.67 dBm
2.438506000 GHz
Ref 10.5 dBm
*Att 20 dB
10 Offset 0.5 dB
1 PK VIEW
LVL
Center 2.438506 GHz
150 kHz/
Span 1.5 MHz

CH28


*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-8.26 dBm
2.472377000 GHz
Ref 10.5 dBm
*Att 20 dB
10 Offset 0.5 dB
1 PK VIEW
LVL
3DB
Center 2.472377 GHz
150 kHz/
Span 1.5 MHz