FCC Radio TEST Report

FCC ID: V4P-MX225

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

Issued Date	:	Sep. 06, 2010
Project No.	:	1008C314
Equipment	:	Dongle
Model Name	:	MX-225
Applicant	:	Shenzhen Fuyeda Industry Development Corp.,Ltd.
Address	:	NO.1,NEWMEN ROAD,TONGSHENG VILLAGE,DALANG STREET,BAO'AN, SHENZHEN, CHINA
Manufacturer	:	Shenzhen Fuyeda Industry Development Corp.,Ltd.
Address	:	NO.1,NEWMEN ROAD,TONGSHENG VILLAGE,DALANG STREET,BAO'AN, SHENZHEN, CHINA

Tested by:
Neutron Engineering Inc. EMC Laboratory
Date of Receipt: Aug. 26, 2010
Date of Test:
Aug. 26, 2010 ~ Sep. 06, 2010

Testing Engineer : _____ (Jeff Yang)

Technical Manager : _____ (Vic Chiu)

Authorized Signatory : _____ (Steven Lu)

Neutron Engineering Inc.

No.3,Jinshagang 1st Road, ShiXia, Dalang Town, Dong Guan, China.
TEL : (0769) 8318-3000 FAX : (0769) 8319-6000

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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Neutron's laboratory quality assurance procedures are in compliance with the **ISO Guide 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

Limitation

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

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1. CERTIFICATION

Equipment:	Dongle
Brand Name :	Lenovo
Model Name.:	MX-225
Applicant:	Shenzhen Fuyeda Industry Development Corp.,Ltd.
Factory:	Shenzhen Fuyeda Industry Development Corp.,Ltd.
Address:	NO.1,NEWMEN ROAD,TONGSHENG VILLAGE,DALANG STREET, BAO'AN, SHENZHEN, CHINA
Date of Test:	Aug. 26, 2010 ~ Sep. 06, 2010
Test Item:	ENGINEERING SAMPLE
Standards:	FCC Part15, Subpart C(15.249)/ ANSI 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-1-1008C314) 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 (15.249)			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.209	Radiated Emission	PASS	
15.249	Radiated Spurious Emission	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 **DG-C03/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** ± **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
DG-C03	CISPR	150 KHz ~ 30MHz	1.94	

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U，(dB)	NOTE
CB03	CISPR	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

<table>
<tr><td>Equipment</td><td>Dongle</td></tr>
<tr><td>Brand Name</td><td>Lenovo</td></tr>
<tr><td>Model Name.</td><td>MX-225</td></tr>
<tr><td>OEM Brand/Model Name</td><td>N/A</td></tr>
<tr><td>Model Difference</td><td>N/A</td></tr>
<tr><td>Product Description</td><td>The EUT is a Dongle.
<table>
<tr><td>Product Type</td><td>Low Power Communication Device</td></tr>
<tr><td>Operation Frequency:</td><td>2402~2476 MHz</td></tr>
<tr><td>Modulation Type:</td><td>GFSK</td></tr>
<tr><td>Date rate:</td><td>2Mbps</td></tr>
<tr><td>Number Of Channel</td><td>75CH .Please see note 2.</td></tr>
<tr><td>Antenna Designation:</td><td>Printed antenna</td></tr>
<tr><td>Antenna Gain(Peak)</td><td>-0.7 dBi</td></tr>
<tr><td>Output Power:</td><td>69.55 dBuV/m (AV Max.)</td></tr>
</table>
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.</td></tr>
<tr><td>Channel List</td><td>Please refer to the Note 2.</td></tr>
<tr><td>Power Source</td><td>DC Voltage supplied from Host System</td></tr>
<tr><td>Power Rating</td><td>I/P AC 120V/60Hz O/P DC 5V</td></tr>
<tr><td>Connecting I/O Port(s)</td><td>Please refer to the User's Manual</td></tr>
</table>

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)
01	2402	28	2429	55	2456
02	2403	29	2430	56	2457
03	2404	30	2431	57	2458
04	2405	31	2432	58	2459
05	2405	32	2433	59	2460
06	2406	33	2434	60	2461
07	2407	34	2435	61	2462
08	2408	35	2436	62	2463
09	2409	36	2437	63	2464
10	2410	37	2438	64	2465
11	2411	38	2439	65	2466
12	2412	39	2440	66	2467
13	2413	40	2441	67	2468
14	2414	41	2442	68	2469
15	2415	42	2443	69	2470
16	2416	43	2444	70	2471
17	2417	44	2445	71	2472
18	2418	45	2446	72	2473
19	2419	46	2447	73	2474
20	2420	47	2448	74	2475
21	2421	48	2449	75	2476
22	2422	49	2450		
23	2423	50	2451		
24	2425	51	2452		
25	2426	52	2453		
26	2427	53	2454		
27	2428	54	2455		

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Printed Antenna	N/A	-0.7

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.

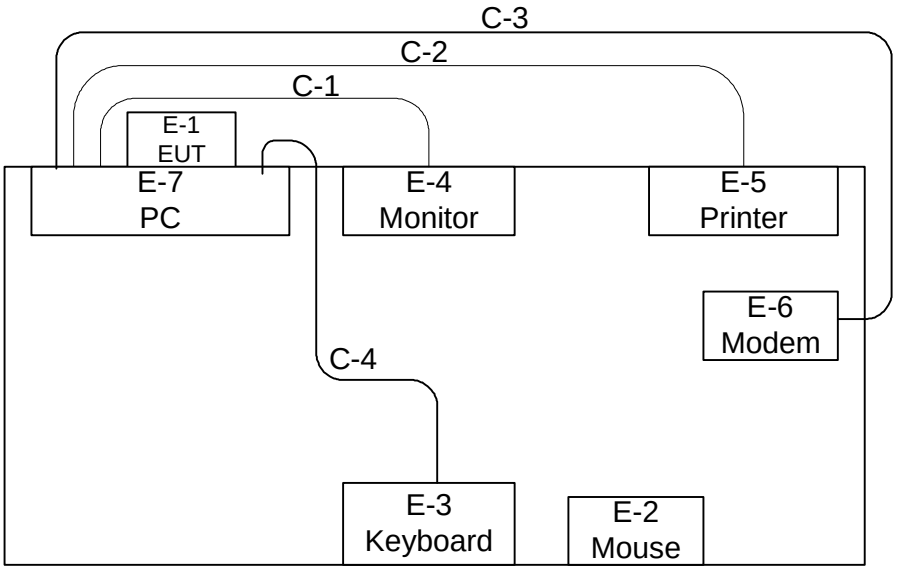
Pretest Mode	Description
Mode 1	CH Lower - 2402MHz
Mode 2	CH Middle - 2441MHz
Mode 3	CH Highest -2476MHz
Mode 4	Normal Link

For Conducted Test	
Final Test Mode	Description
Mode 4	Normal Link

For Radiated Test	
Final Test Mode	Description
Mode 1	CH Lower - 2402MHz
Mode 2	CH Middle - 2441MHz
Mode 3	CH Highest -2476MHz

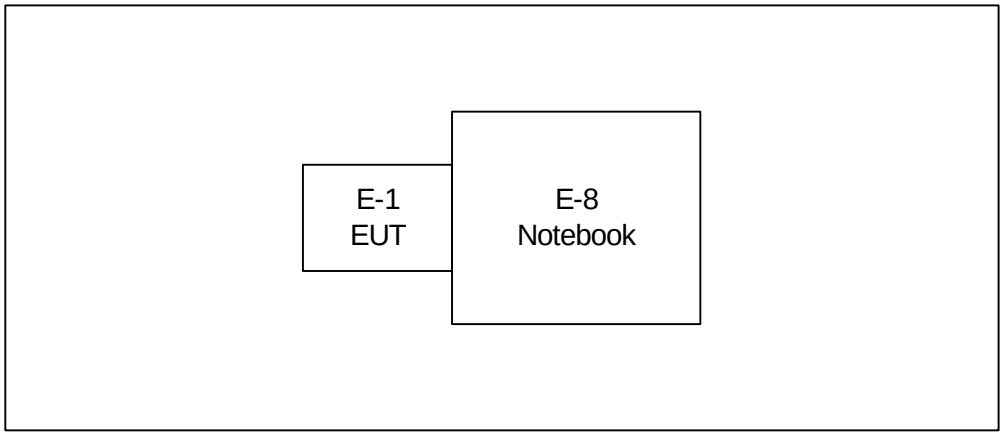
3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conduction:



C-1: D-Sub Cable
C-2: Parallel Cable
C-3: RS232 Cable
C-4: USB Cable

Radiation:



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	Dongle	Lenovo	MX-225	V4P-MX225	N/A	EUT
E- 2	Lenovo Wireless Mouse	Lenovo	N3903	V4P-MS225OR	N/A	
E-3	Keyboard	Lenovo	LJ4000U	DOC	OL0758492501446	
E-4	LCD monitor	Lenovo	L2021	DOC	N/A	
E-5	Printer	Lenovo	M630	DOC	SP00335371	
E-6	Modem	Lenovo	LEM56SP	DOC	004000137896	
E-7	PC	Lenovo	M4600V	DOC	SS0840636	
E-8	Notebook	Lenovo	Y460	N/A	N/A	

Item	Shielded Type	Ferrite Core	Length	Note
C-1	YES	YES	1.5M	
C-2	YES	NO	1.5M	
C-3	YES	NO	1.5M	
C-4	YES	YES	1.8M	

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

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	LISN	EMCO	3816/2	00052765	May.26.2011
2	LISN	Rolf Heine	NNB-2-16Z	99044	May.26.2011
3	50Ω Terminator	SHX	TF2-3G-A	08122901	May.26.2011
4	Transient Limiter	Agilent	11947A	3107A03668	May.26.2011
5	Test Cable	N/A	C-06_C03	N/A	Nov.16.2010
6	EMI TEST RECEIVER	R&S	ESCS30	8333641017	May.26.2011

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

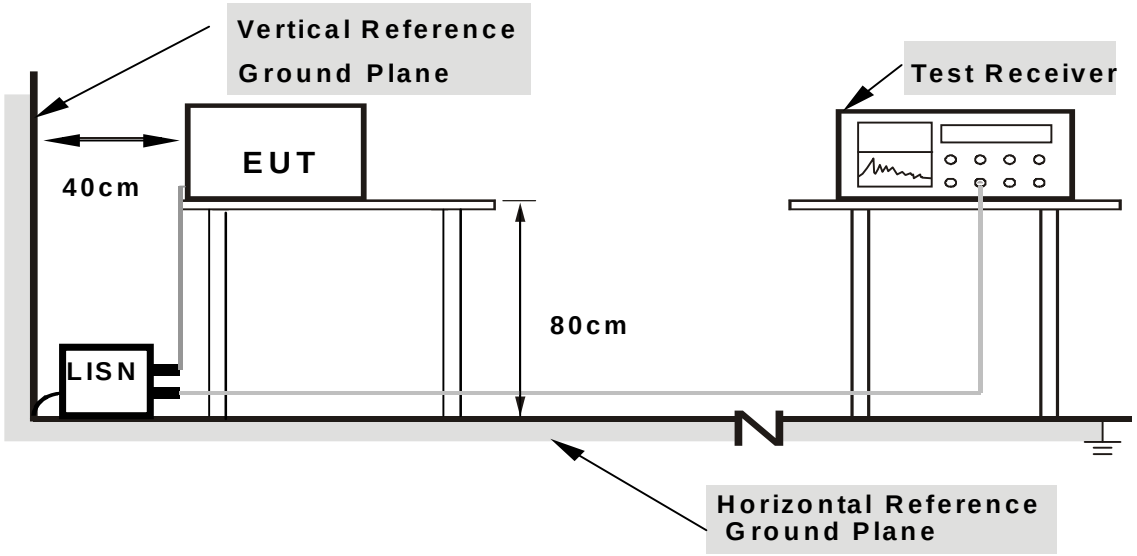
4.1.3 TEST PROCEDURE

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



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 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

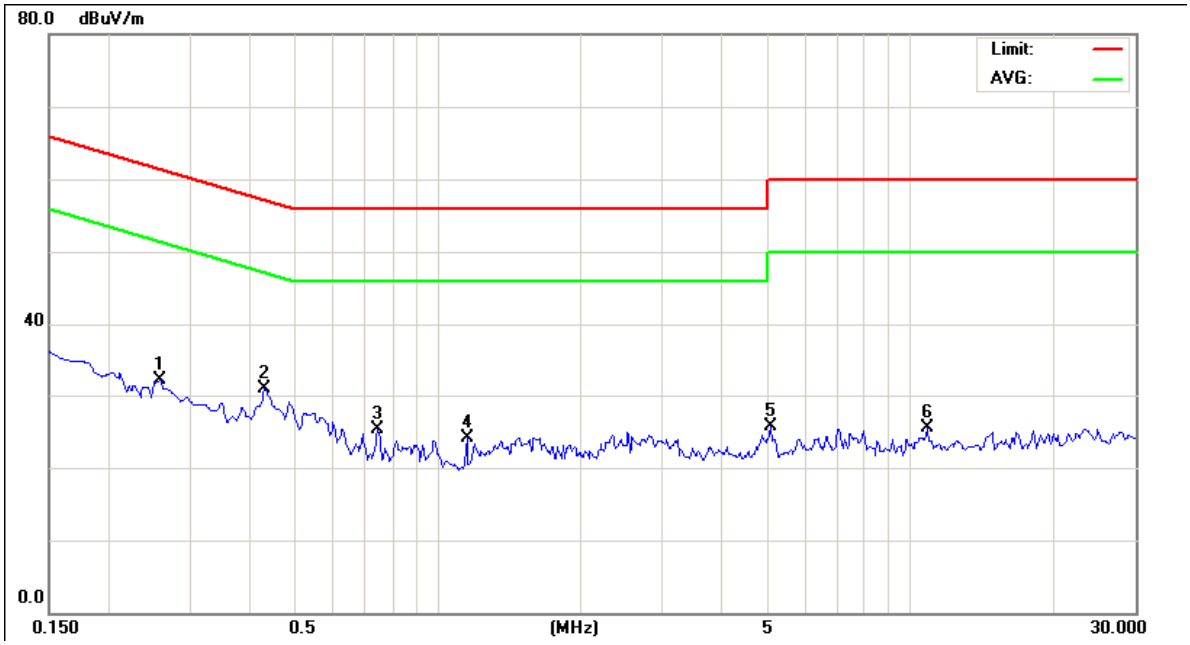
EUT：	Dongle	Model Name. ：	MX-225
Temperature：	23℃	Relative Humidity：	51 %
Pressure：	1001 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	Normal Link		

Freq. (MHz)	Terminal L/N	Measured(dBuV)		Limits(dBuV)		Margin (dB)	Note
		QP-Mode	AV-Mode	QP-Mode	AV-Mode		
0.26	Line	32.03	*	61.50	51.50	-29.47	(QP)
0.43	Line	30.88	*	57.27	47.27	-26.39	(QP)
0.74	Line	25.37	*	56.00	46.00	-30.63	(QP)
1.15	Line	24.04	*	56.00	46.00	-31.96	(QP)
5.08	Line	25.63	*	60.00	50.00	-34.37	(QP)
10.90	Line	25.54	*	60.00	50.00	-34.46	(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.



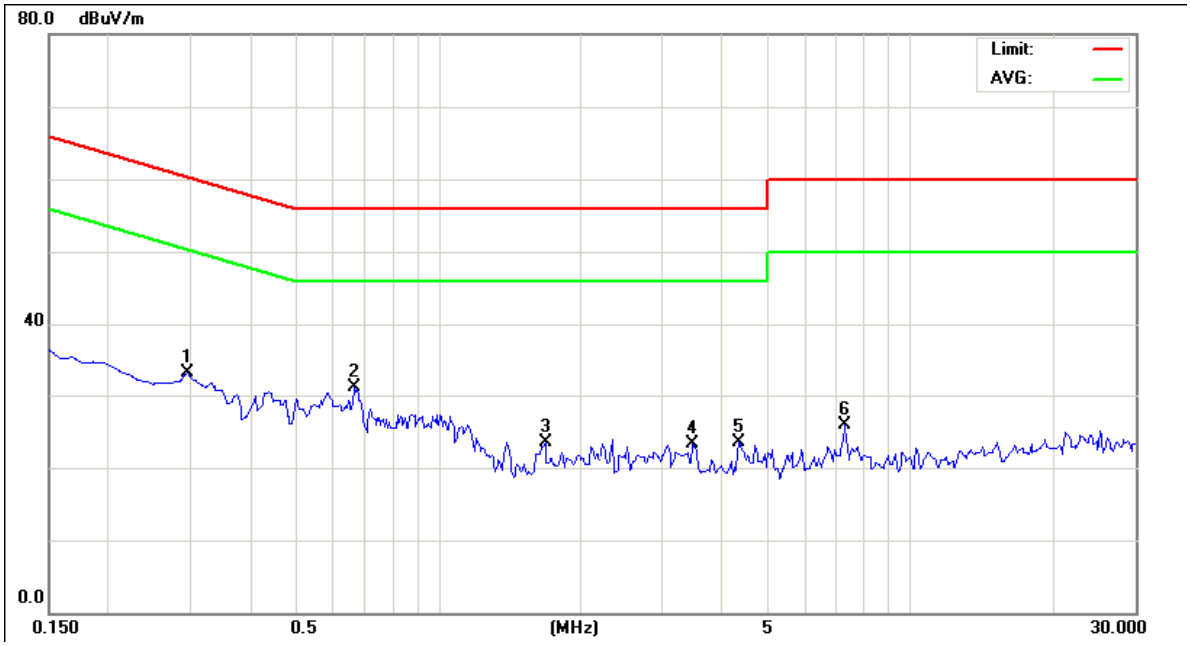
EUT：	Dongle	Model Name. ：	MX-225
Temperature：	23℃	Relative Humidity：	51 %
Pressure：	1001 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	Normal Link		

Freq. (MHz)	Terminal L/N	Measured(dBuV)		Limits(dBuV)		Margin (dB)	Note
		QP-Mode	AV-Mode	QP-Mode	AV-Mode		
0.29	Neutral	33.02	*	60.41	50.41	-27.39	(QP)
0.66	Neutral	31.01	*	56.00	46.00	-24.99	(QP)
1.69	Neutral	23.56	*	56.00	46.00	-32.44	(QP)
3.47	Neutral	23.33	*	56.00	46.00	-32.67	(QP)
4.35	Neutral	23.54	*	56.00	46.00	-32.46	(QP)
7.28	Neutral	25.86	*	60.00	50.00	-34.14	(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 (FCC 15.209)

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

Harmonic emissions limits comply with below 54 dBuV/m at 3m. Other emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or comply with the radiated emissions limits specified in section 15.209(a) limit in the table below has to be followed.

Note:

(1) The tighter limit applies at the band edges.

(2) Emission level (dBuV/m)=20log Emission level (uV/m).

LIMITS OF RADIATED EMISSION MEASUREMENT (FCC 15.209)

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).

LIMITS OF RADIATED EMISSION MEASUREMENT (FCC Part 15.249)

FCC Part15 (15.249) , Subpart C	
Limit	Frequency Range (MHz)
Field strength of fundamental 50000 μV/m (94 dBμV/m) @ 3 m	2400-2483.5
Field strength of harmonics 500 μV/m (54 dBμV/m) @ 3 m	Above 2483.5

4.2.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	ETS	3115	00075789	May.12.2011
2	Amplifier	Agilent	8449B	3008A02274	May.26.2011
3	Spectrum	Agilent	E4408B	US39240143	Nov.16.2010
4	Test Cable	HUBER+SUHNER	CB03 High Fre	N/A	May.03.2011
5	Antenna	Schwarbeck	VULB9160	9160-3232	May.26.2011
6	Amplifier	HP	8447D	2944A09673	May.26.2011
7	Test Receiver	R&S	ESCI	100895	May.26.2011
8	Test Cable	N/A	C-01_CB03	N/A	Jul.05.2011
9	Controller	CT	SC100	N/A	N/A

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
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, Average=PK-dycty cycle

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

DUTY CYCLE: TX 2476MHz (2Mbps)

Dwell time=ON/ON+OFF

ON: 0.296msec

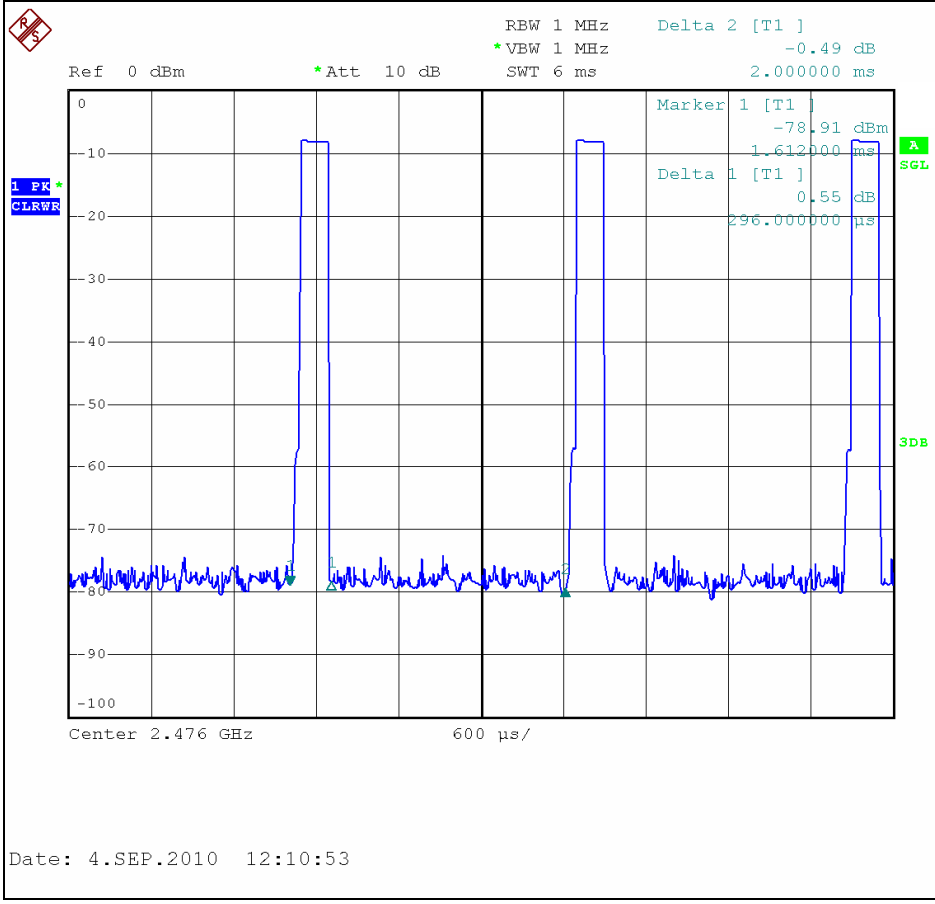
ON+OFF: (total time):2.0msec

Dwell time: 14.8%

AV=PK+20 log(Dwell time)

AV=PK-16.59

Total time(ON+OFF)= 2.0 msec ； ON= 0.296 msec



4.2.3 TEST PROCEDURE

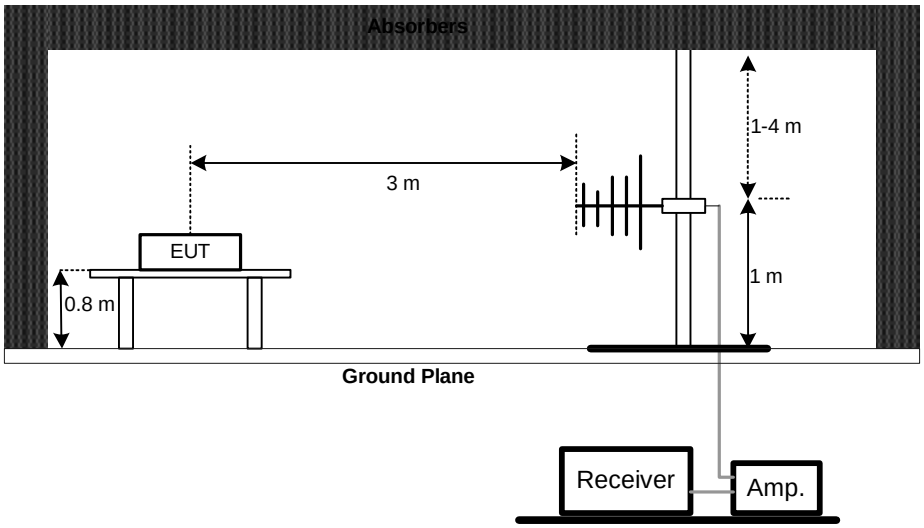
a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m meter semi-anechoic chamber. The table was rotated 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

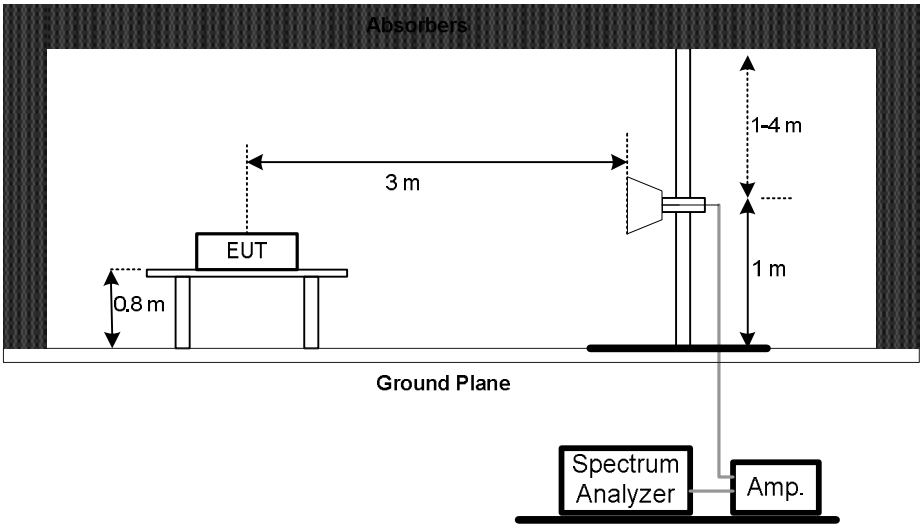
No deviation

4.2.5 TEST SETUP

(A) Radiated Emission Test Set-Up Frequency Below 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：	Dongle	Model Name. ：	MX-225
Temperature：	25℃	Relative Humidity：	51 %
Pressure：	1001 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX 2402MHz		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
39.60	V	41.12	-13.81	27.31	40.00	- 12.69	
167.55	V	48.17	-19.03	29.14	43.50	- 14.36	
201.09	V	52.25	-21.70	30.55	43.50	- 12.95	
254.87	V	50.15	-16.57	33.58	46.00	- 12.42	
308.12	V	47.36	-15.20	32.16	46.00	- 13.84	
397.34	V	47.30	-12.26	35.04	46.00	- 10.96	

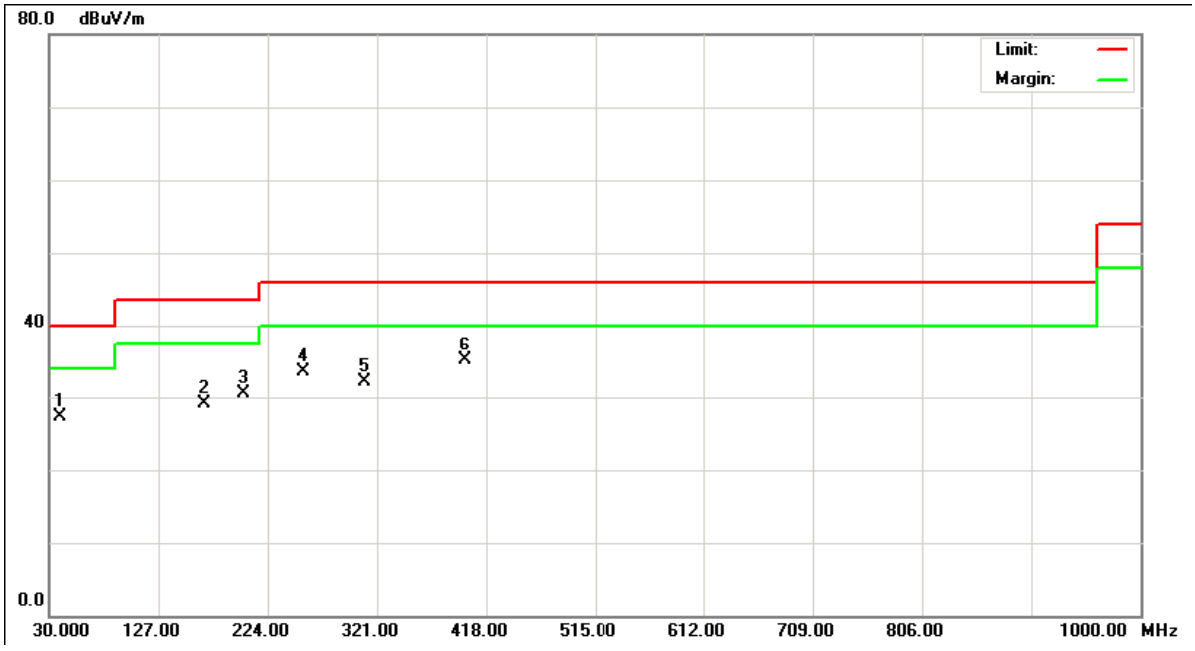
Remark：

(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.

(3) Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Peak detector mode or QP 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.



EUT：	Dongle	Model Name. ：	MX-225
Temperature：	25℃	Relative Humidity：	51 %
Pressure：	1001 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX 2402MHz		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
98.86	H	51.32	-21.54	29.78	43.50	- 13.72	
194.90	H	50.30	-21.92	28.38	43.50	- 15.12	
276.98	H	45.26	-15.23	30.03	46.00	- 15.97	
303.76	H	48.92	-15.20	33.72	46.00	- 12.28	
371.44	H	44.92	-13.92	31.00	46.00	- 15.00	
396.28	H	47.53	-12.34	35.19	46.00	- 10.81	

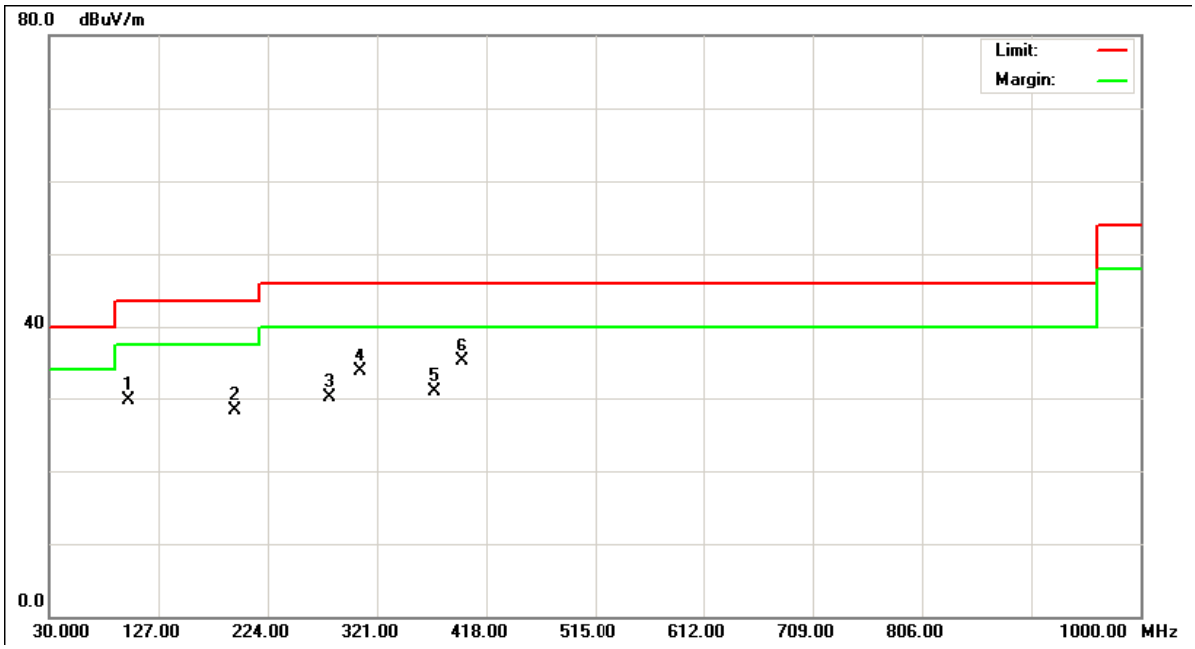
Remark：

(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.

(3) Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Peak detector mode or QP 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.



4.2.8 TEST RESULTS (ABOVE 1000 MHz)

EUT：	Dongle	Model Name. ：	MX-225
Temperature：	25℃	Relative Humidity：	51 %
Pressure：	1001 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX 2402MHz		

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	23.18	6.59	31.54	54.72	38.13	74.00	54.00	X/E
2402.40	**V**	**49.86**	**33.27**	**31.56**	**81.42**	**64.83**	**114.00**	**94.00**	**X/F**
4803.82	V	45.96	29.37	5.94	51.90	35.31	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.

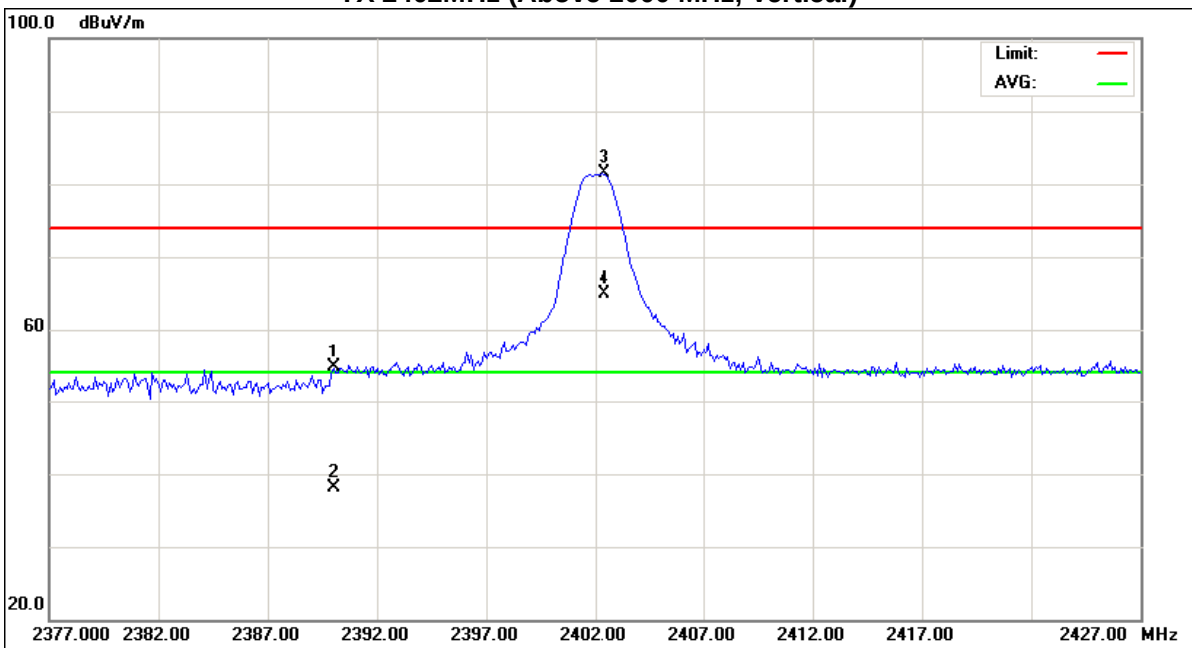
(6) EUT Orthogonal Axis：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

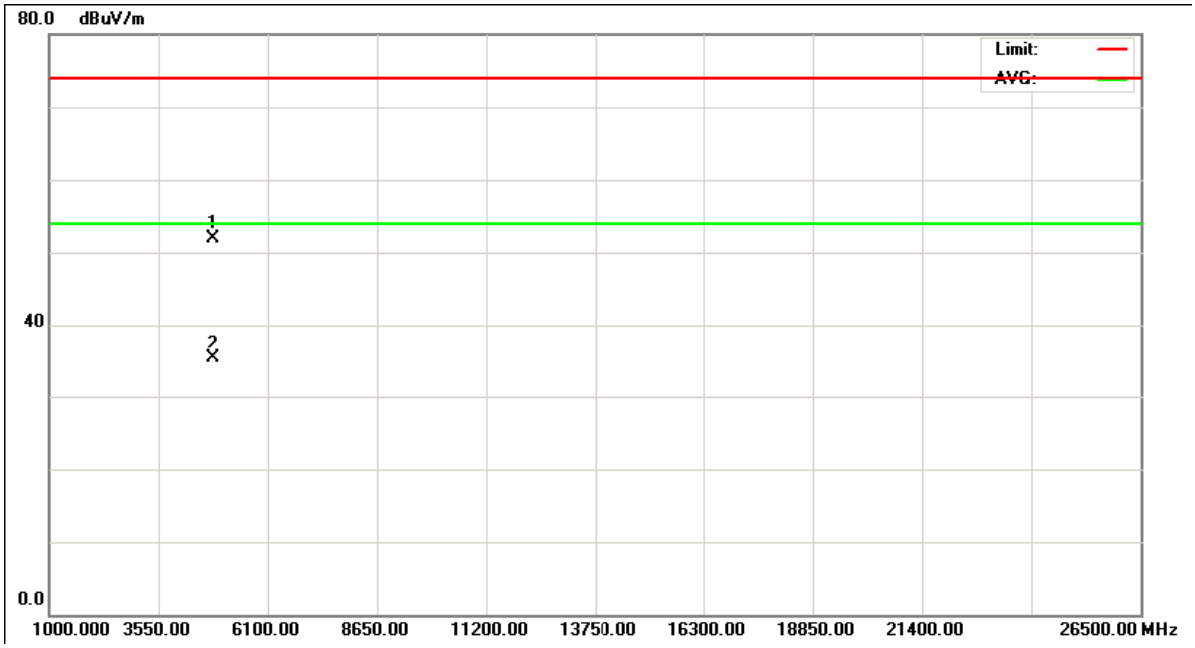
(7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna

(8) The average value of fundamental frequency is:
Average = Peak value + 20log(Duty cycle) ，Final AV=PK-16.59

Orthogonal Axis：X

TX 2402MHz (Above 1000 MHz, Vertical)





EUT：	Dongle	Model Name. ：	MX-225
Temperature：	25℃	Relative Humidity：	51 %
Pressure：	1001 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX 2402MHz		

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	23.55	6.96	31.54	55.09	38.50	74.00	54.00	X/E
2402.00	**H**	**52.96**	**36.37**	**31.56**	**84.52**	**67.93**	**114.00**	**94.00**	**X/F**
4803.76	H	41.96	25.37	5.94	47.90	31.31	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.

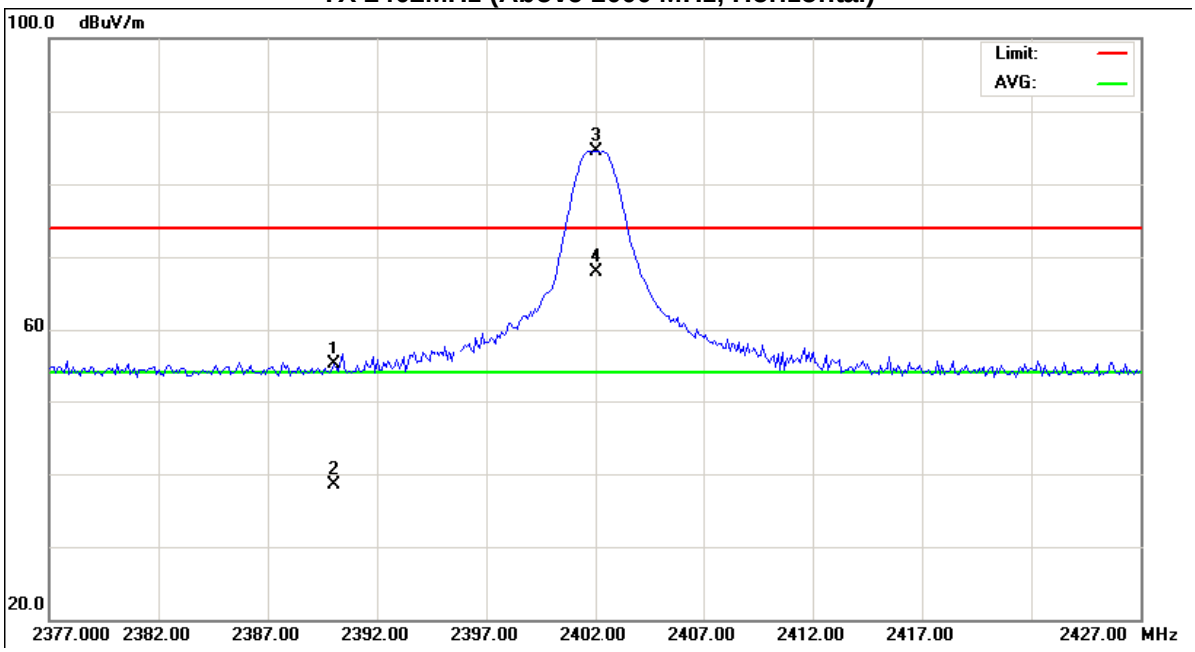
(6) EUT Orthogonal Axis：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

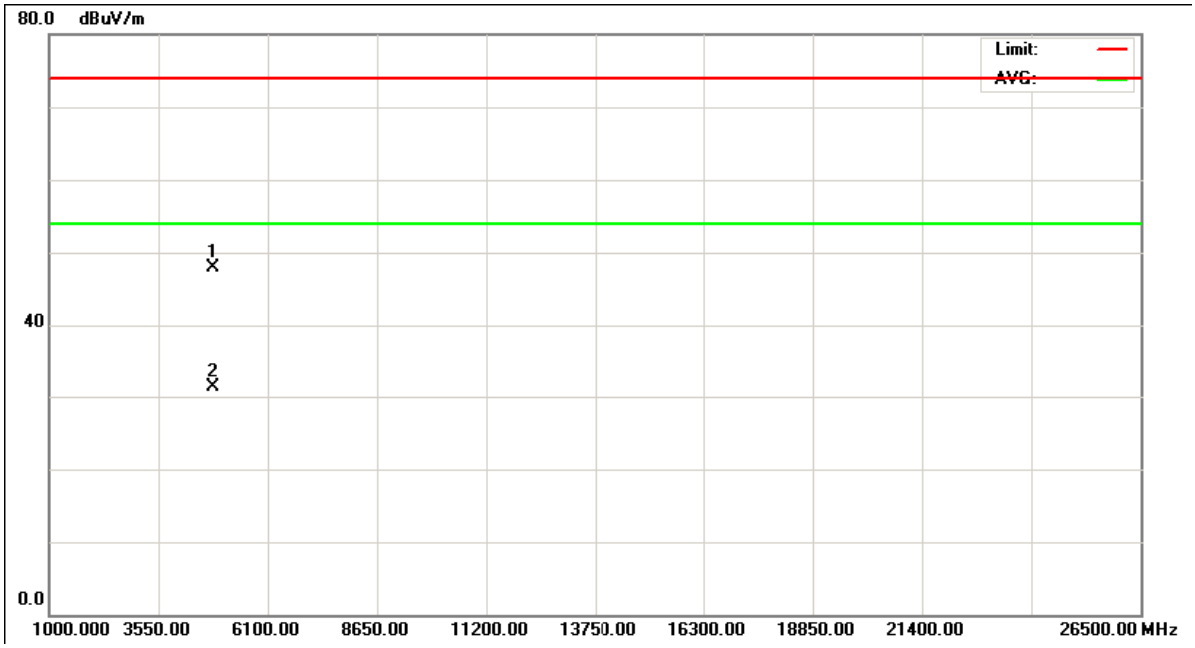
(7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna

(8) The average value of fundamental frequency is:
Average = Peak value + 20log(Duty cycle) ，Final AV=PK-16.59

Orthogonal Axis：X

TX 2402MHz (Above 1000 MHz, Horizontal)





EUT：	Dongle	Model Name. ：	MX-225
Temperature：	25℃	Relative Humidity：	51 %
Pressure：	1001 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX 2441MHz		

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)	
2441.30	**V**	**48.63**	**32.04**	**31.63**	**80.26**	**63.67**	**114.00**	**94.00**	**X/F**
4881.72	V	46.73	30.14	6.17	52.90	36.31	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.

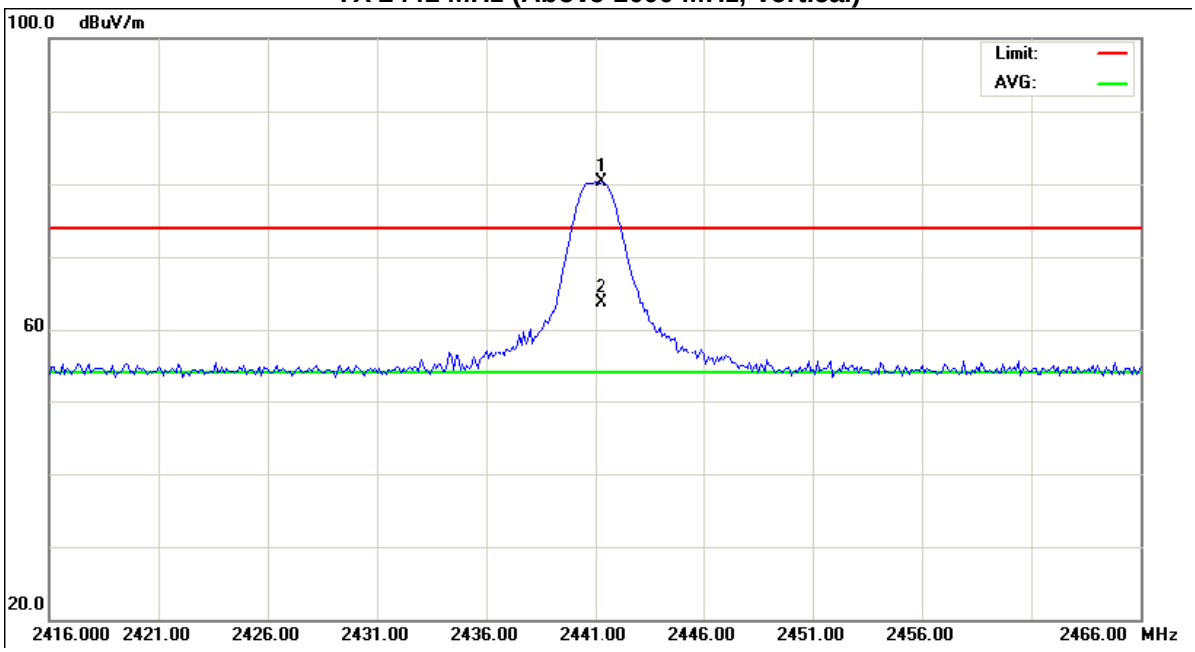
(6) EUT Orthogonal Axis：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

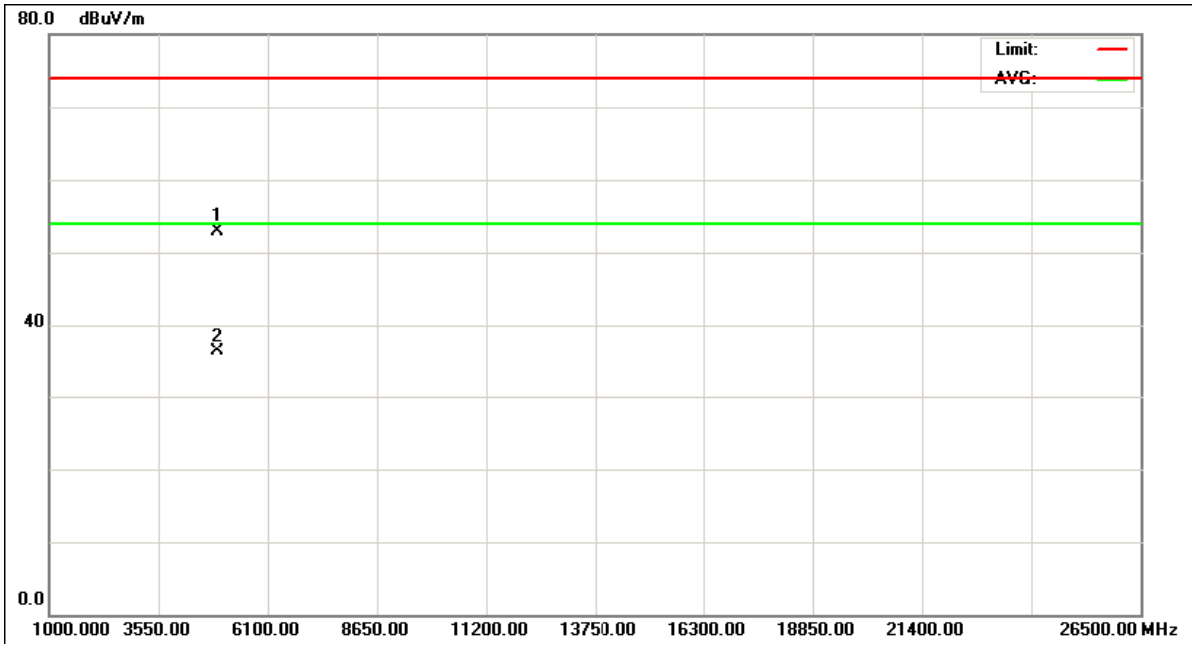
(7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna

(8) The average value of fundamental frequency is:
Average = Peak value + 20log(Duty cycle) ，Final AV=PK-16.59

Orthogonal Axis：X

TX 2441 MHz (Above 1000 MHz, Vertical)





EUT：	Dongle	Model Name. ：	MX-225
Temperature：	25℃	Relative Humidity：	51 %
Pressure：	1001 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX 2441MHz		

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)	
2441.40	**H**	**54.51**	**37.92**	**31.63**	**86.14**	**69.55**	**114.00**	**94.00**	**X/F**
4882.16	H	43.86	27.27	6.17	50.03	33.44	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.

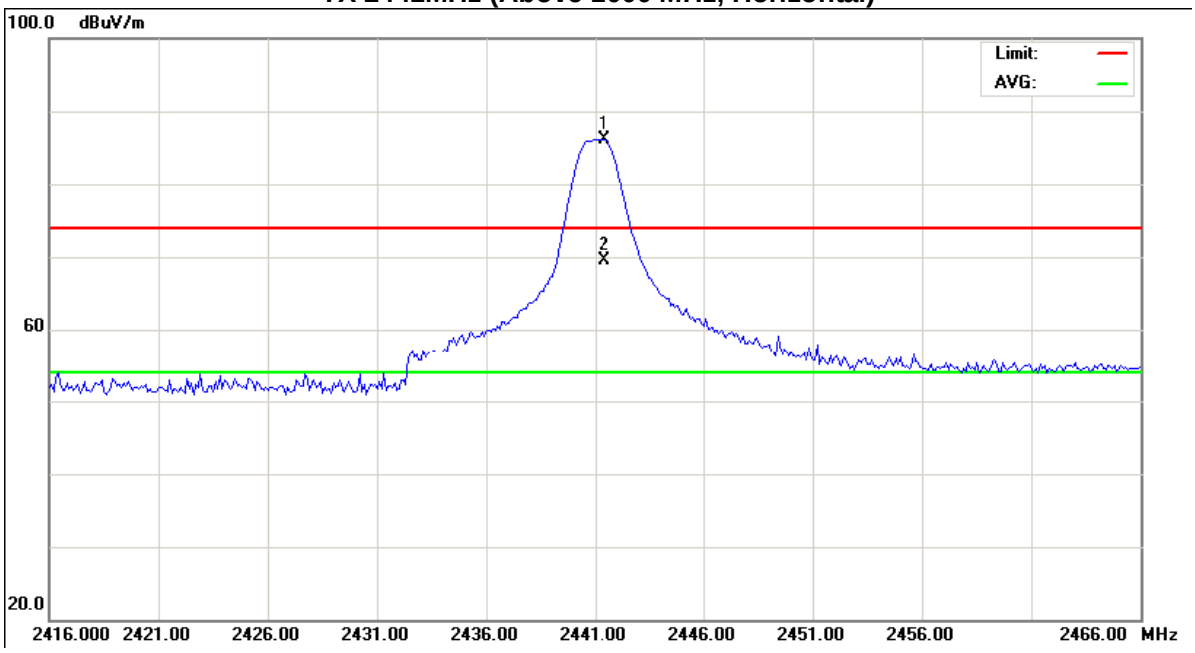
(6) EUT Orthogonal Axis：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

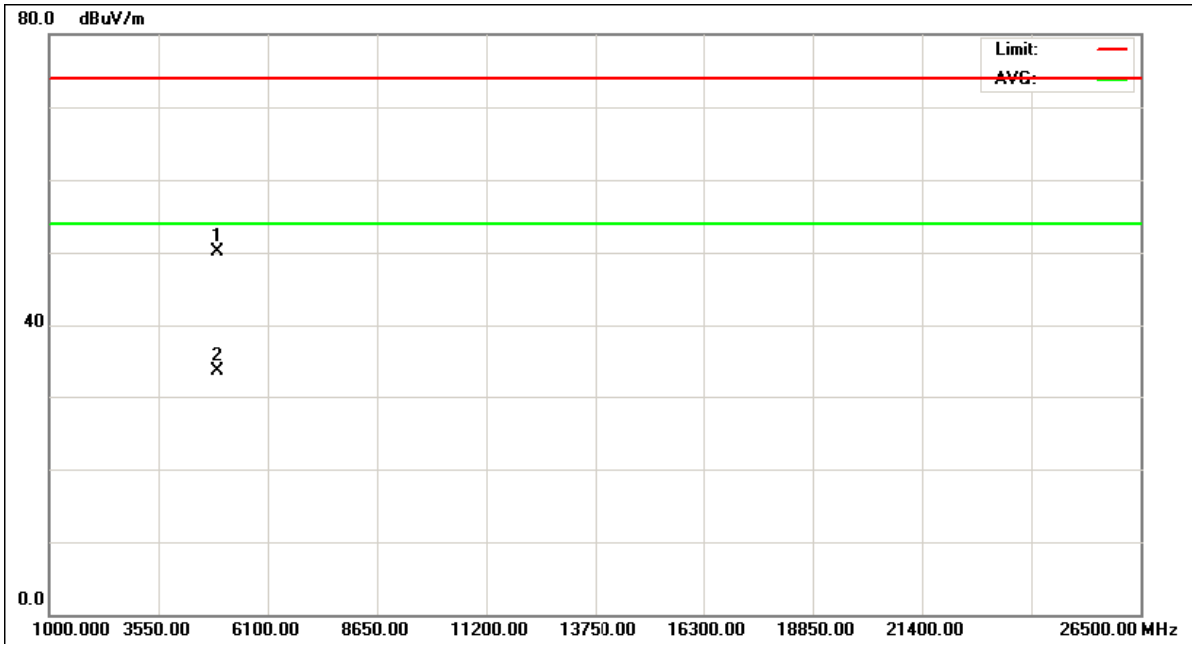
(7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna

(8) The average value of fundamental frequency is:
Average = Peak value + 20log(Duty cycle) ，Final AV=PK-16.59

Orthogonal Axis：X

TX 2441MHz (Above 1000 MHz, Horizontal)





EUT：	Dongle	Model Name. ：	MX-225
Temperature：	25℃	Relative Humidity：	51 %
Pressure：	1001 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX 2476MHz		

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)	
2476.00	**V**	**48.25**	**31.66**	**31.69**	**79.94**	**63.35**	**114.00**	**94.00**	**X/F**
2483.50	V	22.25	5.66	31.70	53.95	37.36	74.00	54.00	X/E
4952.00	V	46.20	29.61	6.37	52.57	35.98	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.

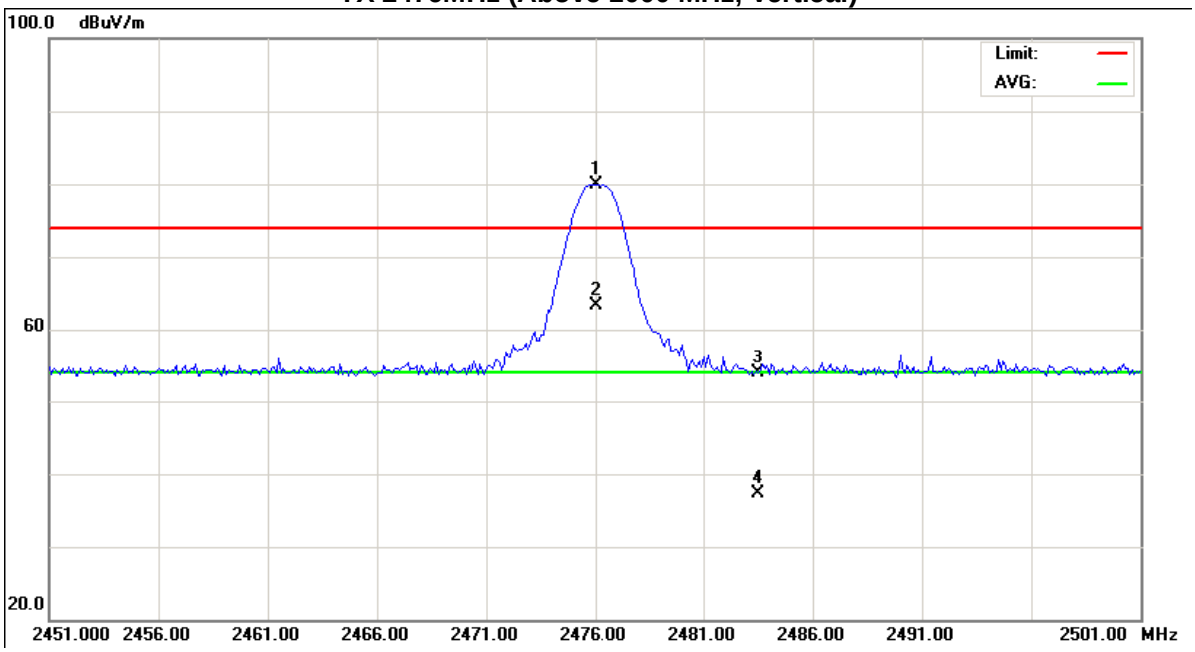
(6) EUT Orthogonal Axis：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

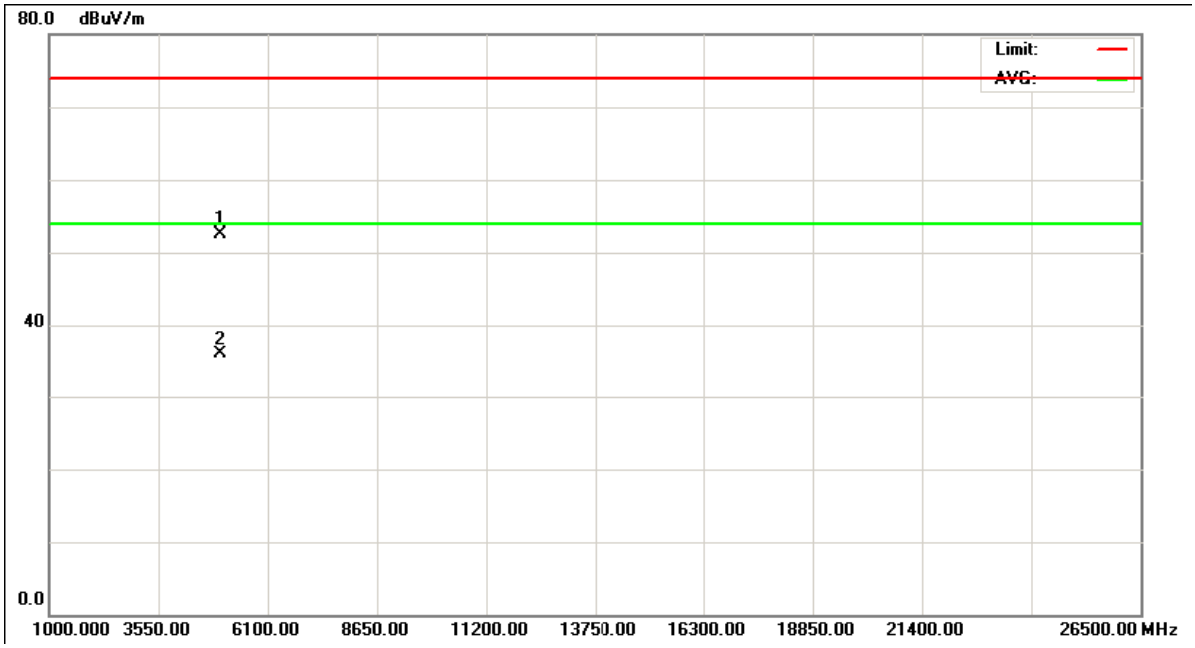
(7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna

(8) The average value of fundamental frequency is:
Average = Peak value + 20log(Duty cycle) ，Final AV=PK-16.59

Orthogonal Axis：X

TX 2476MHz (Above 1000 MHz, Vertical)





EUT：	Dongle	Model Name. ：	MX-225
Temperature：	25℃	Relative Humidity：	51 %
Pressure：	1001 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX 2476MHz		

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
2475.70	**H**	**52.23**	**35.64**	**31.69**	**83.92**	**67.33**	**114.00**	**94.00**	**X/F**
2483.50	H	24.23	7.64	31.70	55.93	39.34	74.00	54.00	X/E
4951.84	H	44.54	27.95	6.37	50.91	34.32	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.

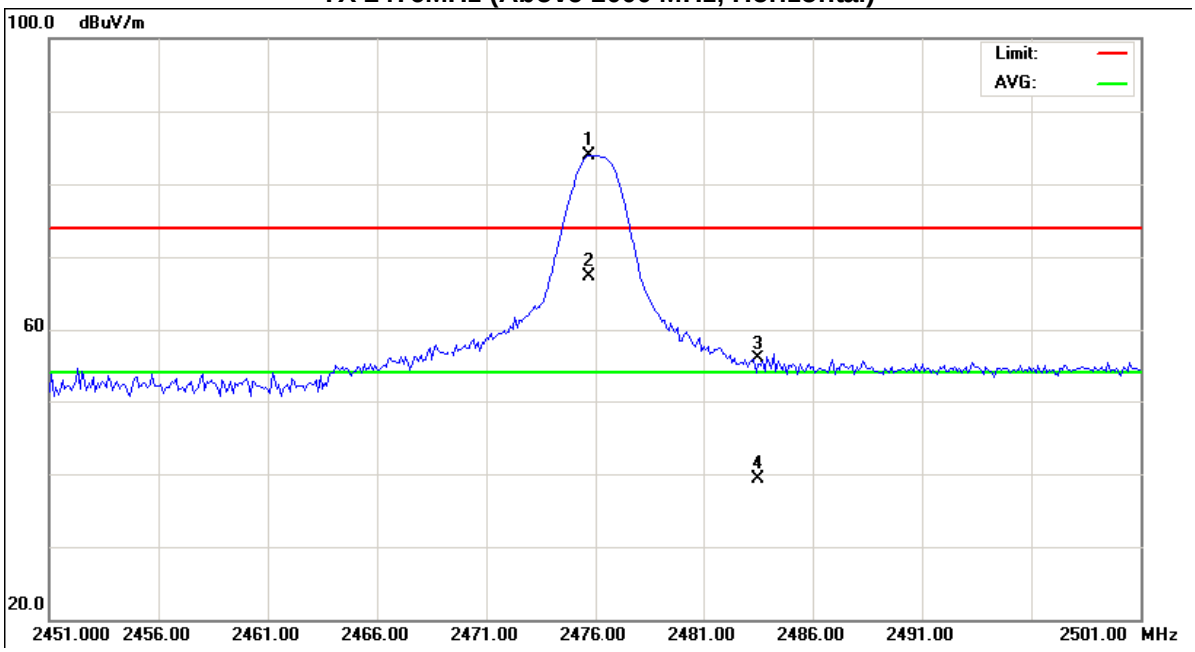
(5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

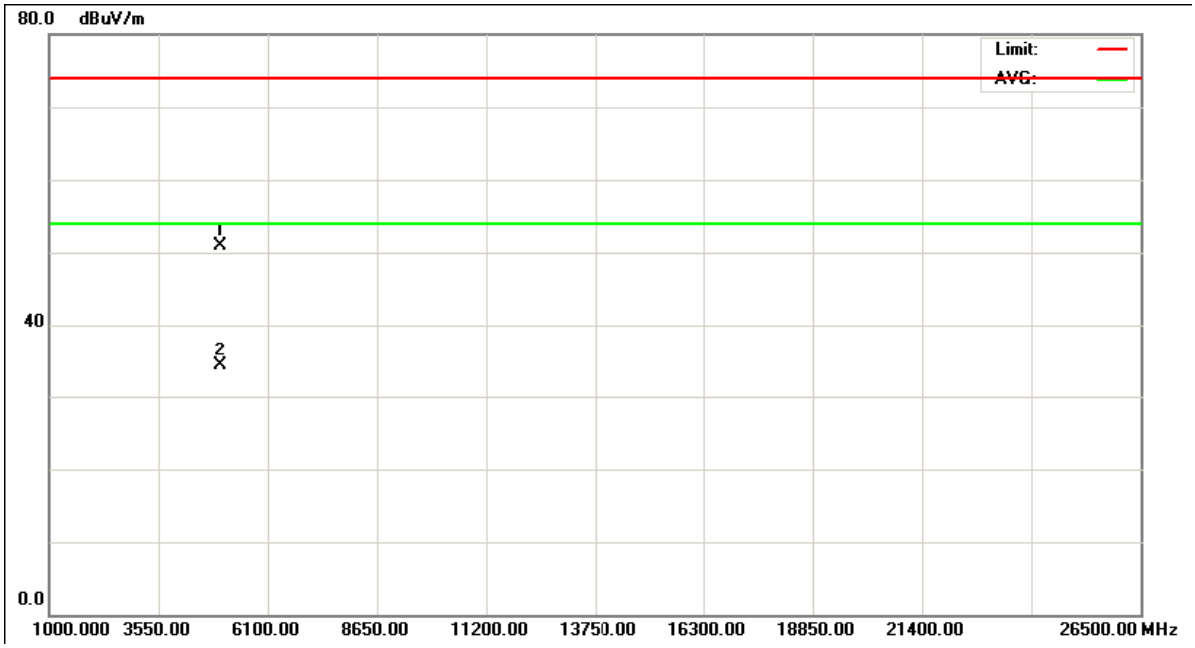
(6) EUT Orthogonal Axis：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

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

(8) The average value of fundamental frequency is:
Average = Peak value + 20log(Duty cycle) ，Final AV=PK-16.59

Orthogonal Axis：X
TX 2476MHz (Above 1000 MHz, Horizontal)





4.2.9 TEST RESULTS (2400 – 2483.5 MHz)

EUT：	Dongle	Model Name. ：	MX-225
Temperature：	25℃	Relative Humidity：	51 %
Pressure：	1001 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX CH 2402MHz/2441MHz/2476MHz		

		Peak	AV		Peak	AV	Peak	AV	
Freq.	Ant.Pol.	Reading		Ant./CL/	Actual FS		Limit3m		
(MHz)	(H/V)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	NOTE
2402.40	V	49.86	33.27	31.56	81.42	64.83	114.00	94.00	CH01
2402.00	H	52.96	36.37	31.56	84.52	67.93	114.00	94.00	CH01
2441.30	V	48.63	32.04	31.63	80.26	63.67	114.00	94.00	CH40
2441.40	H	54.51	37.92	31.63	86.14	69.55	114.00	94.00	CH40
2476.00	V	48.25	31.66	31.69	79.94	63.35	114.00	94.00	CH75
2475.70	H	52.23	35.64	31.69	83.92	67.33	114.00	94.00	CH75

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

(3) 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.

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

(5) The average value of fundamental frequency is:
Average = Peak value + 20log(Duty cycle) ，Final AV=PK-16.59

5. BANDWIDTH TEST

5.1 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov.27.2010

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

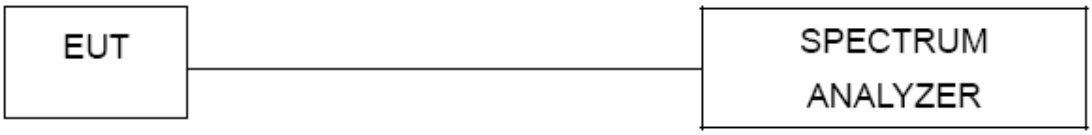
5.2 TEST PROCEDURE

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 = 20 ms.

5.3 DEVIATION FROM STANDARD

No deviation.

5.4 TEST SETUP



5.5 EUT OPERATION CONDITIONS

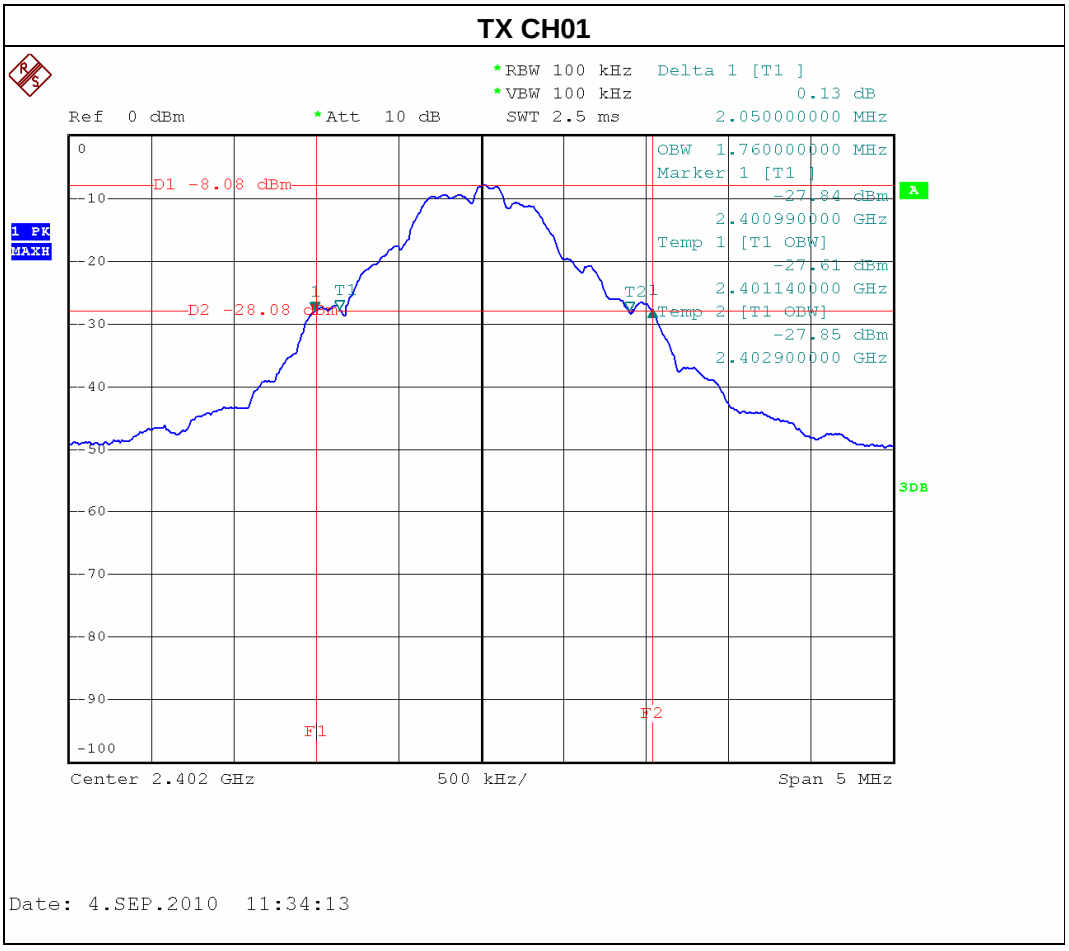
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

5.6 TEST RESULTS

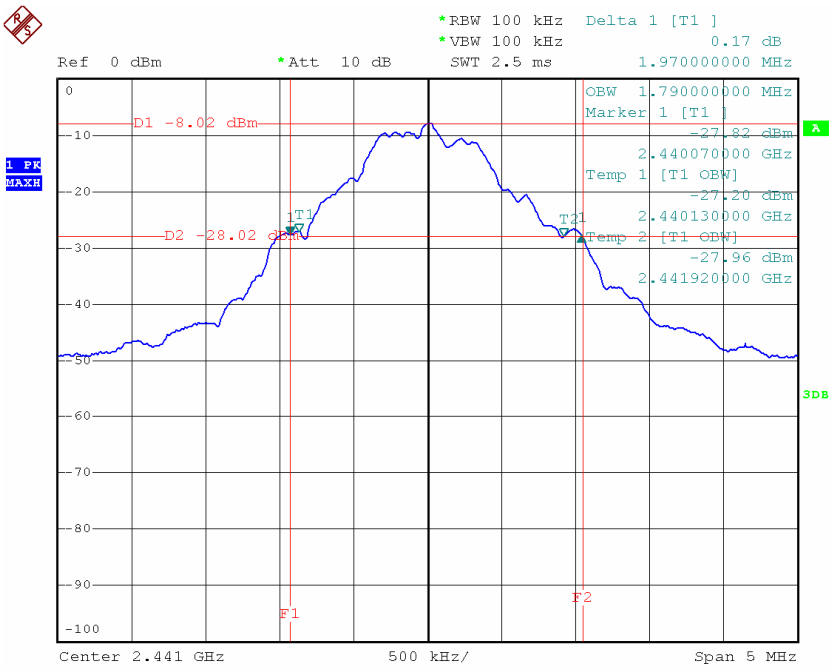
EUT：	Dongle	Model Name. ：	MX-225
Temperature：	20℃	Relative Humidity：	51 %
Pressure：	1001 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX CH 01/40/75		

Test Channel	Frequency (MHz)	20 dBc Bandwidth (MHz)	99% occupied Bandwidth(MHz)
CH01	2402	2.05	1.76
CH40	2441	1.97	1.79
CH75	2476	1.97	1.78

TX CH01

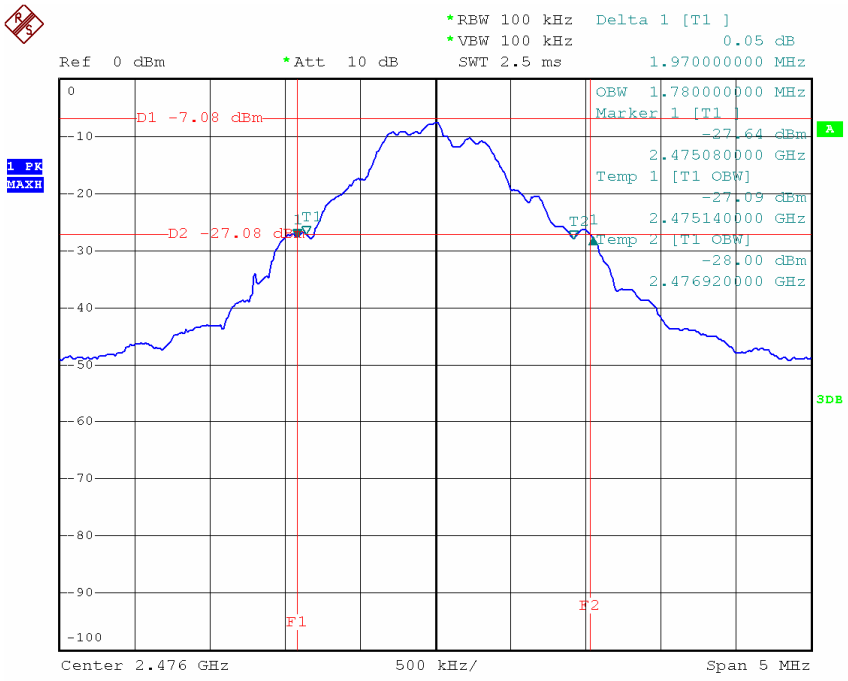


TX CH 40



Date: 4.SEP.2010 11:46:54

TX CH 75



Date: 4.SEP.2010 11:56:30

6. ANTENNA CONDUCTED SPURIOUS EMISSION

6.1 APPLIED PROCEDURES / LIMIT

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

6.1.1 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov.27.2010

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

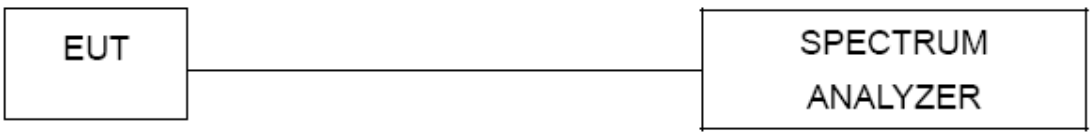
6.1.2 TEST PROCEDURE

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 = 200 ms.

6.1.3 DEVIATION FROM STANDARD

No deviation.

6.1.4 TEST SETUP



6.1.5 EUT OPERATION CONDITIONS

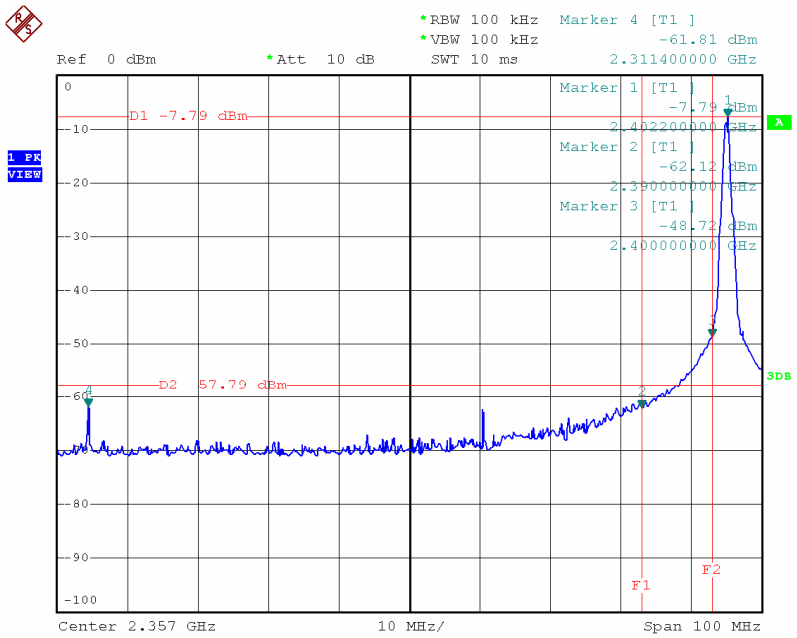
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

6.1.6 TEST RESULTS

EUT：	Dongle	Model Name. ：	MX-225
Temperature：	20℃	Relative Humidity：	51 %
Pressure：	1001 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX CH01, CH75		

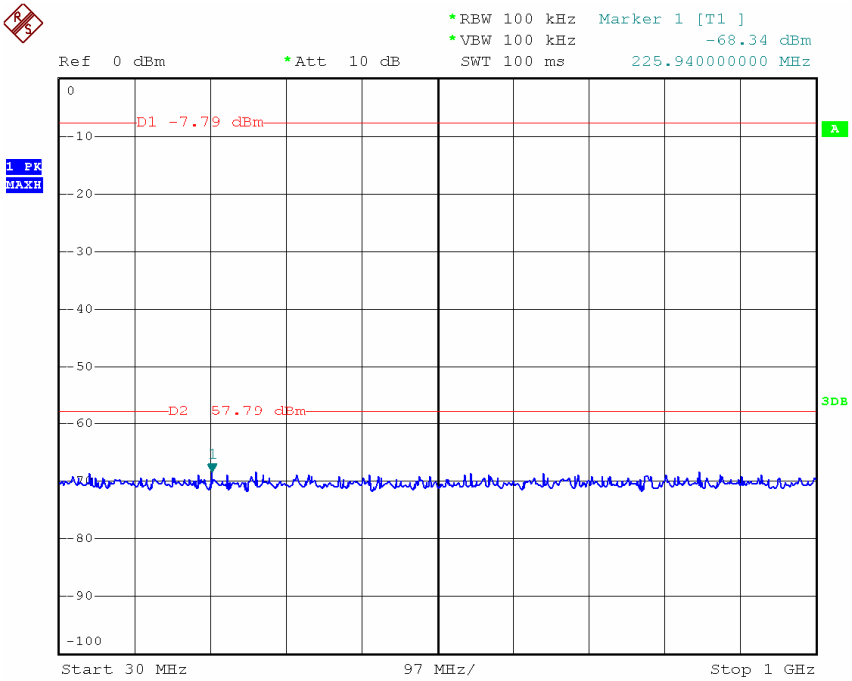
Channel of Worst Data: CH75			
The max. radio frequency power in any 100kHz bandwidth outside the frequency band		The max. radio frequency power in any 100 kHz bandwidth within the frequency band.	
FREQUENCY(MHz)	POWER(dBm)	FREQUENCY(MHz)	POWER(dBm)
2311.40	-61.81	2483.50	-57.93
Result			
In any 100kHz bandwidth outside the frequency band, the radio frequency power is at least 50dB below that in the 100kHz bandwidth within the band that contains the highest lever of the desired power.			

TX CH01 for bandedge



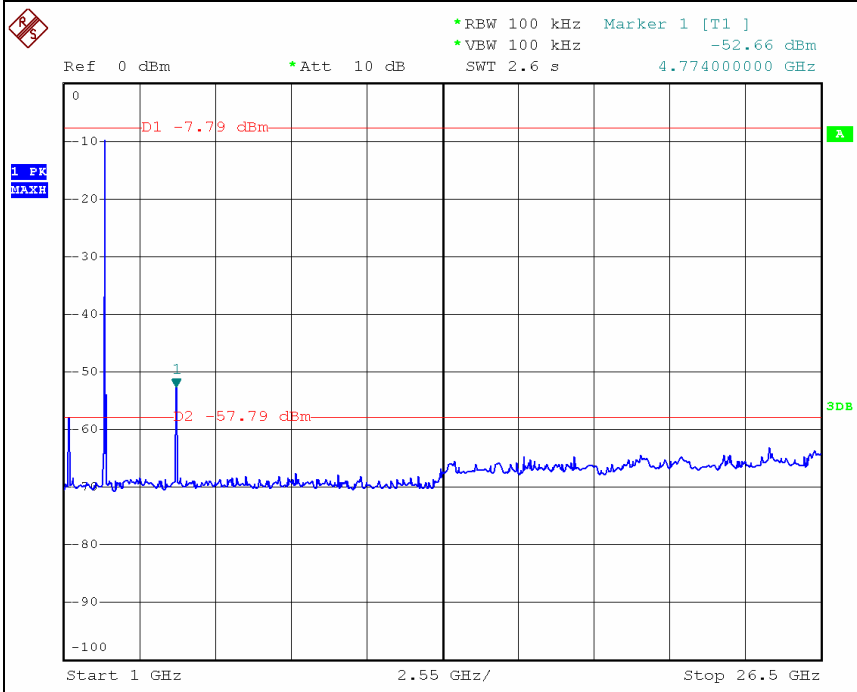
Date: 4.SEP.2010 11:30:51

TX CH01 (30MHz~1GHz)



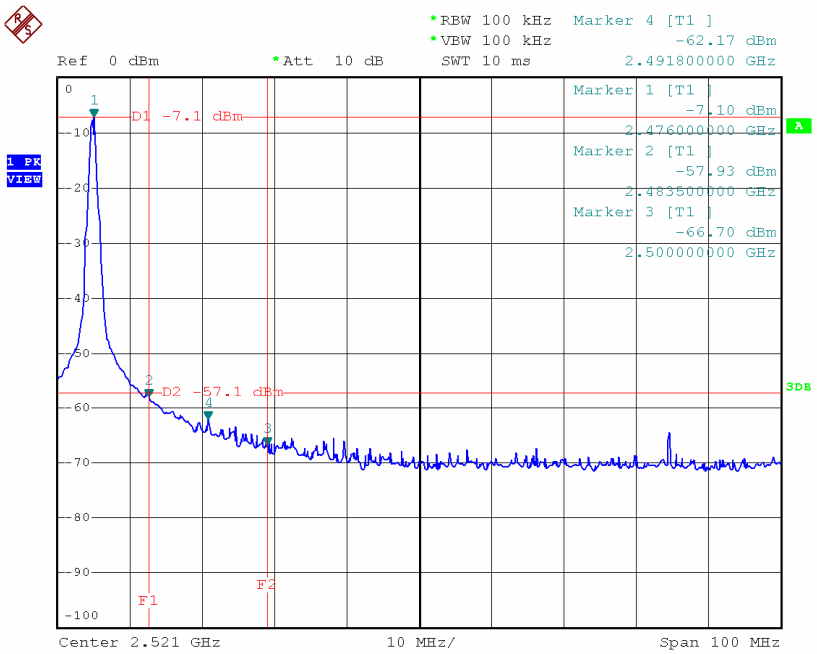
Date: 4.SEP.2010 11:44:12

TX CH01(1GHz～10th Harmonic)



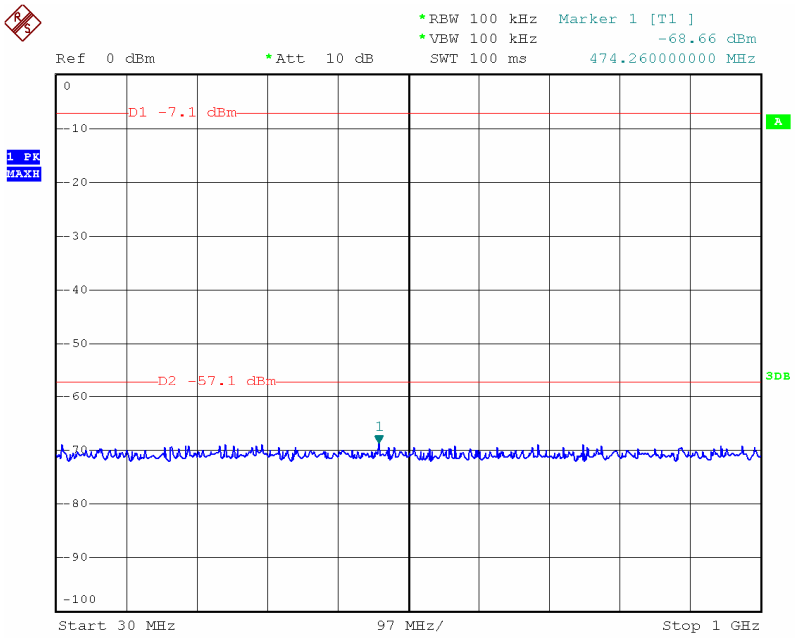
Date: 4.SEP.2010 11:43:20

TX CH75 for bandedge



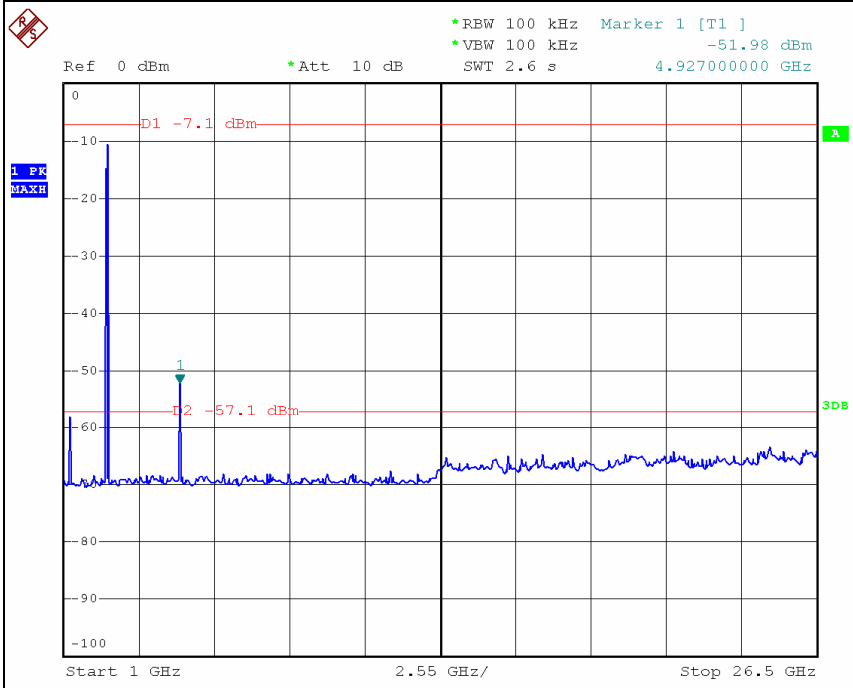
Date: 4.SEP.2010 12:03:08

TX CH75(30MHz~1GHz)



Date: 4.SEP.2010 12:04:09

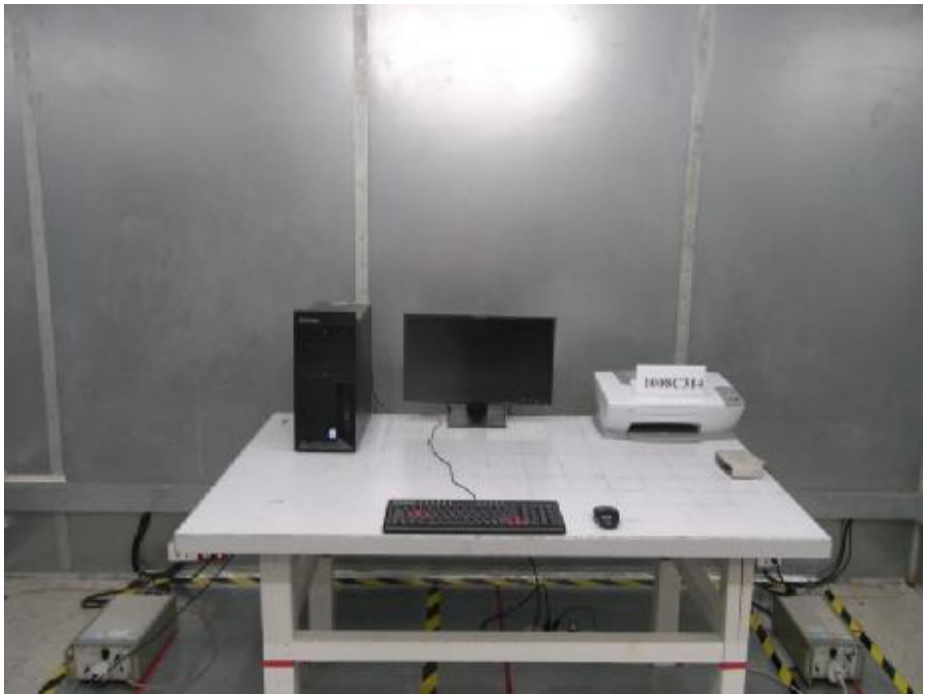
TX CH 75(1GHz～10th Harmonic)



Date: 4.SEP.2010 12:05:41

7. EUT TEST PHOTO

Conducted Measurement Photos



Radiated Measurement Photos