



Neutron Engineering Inc.

FCC Radio Test Report

FCC ID: YLDJRB11

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

Issued Date : Feb. 18, 2011
Project No. : 1101C209
Equipment : 2.4GHz Wireless Desktop with Optical Mouse
Model Name : JM-889G24;JM-890G24;KB5150W

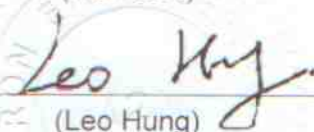
Applicant : VSO TECHNOLOGY (DONG GUAN) CO.,LTD.
Address : No.58 Long Tou Road, Long Jian Tian, Huang
Jiang, Dong Guan, GuangDong ,China

Tested by:
Neutron Engineering Inc. EMC Laboratory
Date of Receipt: Feb. 08, 2011
Date of Test:
Feb. 08, 2011 ~ Feb. 10, 2011

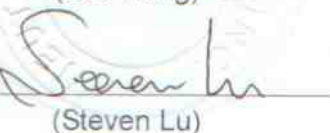
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Declaration

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.



Table of Contents	Page
1 . CERTIFICATION	6
2 . SUMMARY OF TEST RESULTS	7
2.1 TEST FACILITY	8
2.2 MEASUREMENT UNCERTAINTY	8
3 . GENERAL INFORMATION	9
3.1 GENERAL DESCRIPTION OF EUT	9
3.2 DESCRIPTION OF TEST MODES	11
3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING	11
3.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	12
3.5 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)	13
4 . EMC EMISSION TEST	14
4.1 CONDUCTED EMISSION MEASUREMENT	14
4.1.1 POWER LINE CONDUCTED EMISSION LIMITS	14
4.1.2 MEASUREMENT INSTRUMENTS LIST AND SETTING	14
4.1.3 TEST PROCEDURE	15
4.1.4 DEVIATION FROM TEST STANDARD	15
4.1.5 TEST SETUP	15
4.1.6 EUT OPERATING CONDITIONS	15
4.1.7 TEST RESULTS	16
4.2 RADIATED EMISSION MEASUREMENT	17
4.2.1 RADIATED EMISSION LIMITS	17
4.2.2 MEASUREMENT INSTRUMENTS LIST AND SETTING	18
4.2.3 TEST PROCEDURE	19
4.2.4 DEVIATION FROM TEST STANDARD	19
4.2.5 TEST SETUP	20
4.2.6 EUT OPERATING CONDITIONS	20
4.2.7 TEST RESULTS (BETWEEN 30 – 1000 MHZ)	21
4.2.8 TEST RESULTS (ABOVE 1000 MHZ)	23
5 . NUMBER OF HOPPING CHANNEL	35
5.1 APPLIED PROCEDURES / LIMIT	35
5.1.1 MEASUREMENT INSTRUMENTS LIST AND SETTING	35
5.1.2 TEST PROCEDURE	35
5.1.3 DEVIATION FROM STANDARD	35
5.1.4 TEST SETUP	35
5.1.5 EUT OPERATION CONDITIONS	35
5.1.6 TEST RESULTS	36



Table of Contents	Page
6 . AVERAGE TIME OF OCCUPANCY	37
6.1 APPLIED PROCEDURES / LIMIT	37
6.1.1 MEASUREMENT INSTRUMENTS LIST	37
6.1.2. TEST PROCEDURES	37
6.1.3. TEST SETUP LAYOUT	37
6.1.4. TEST DEVIATION	37
6.1.5. EUT OPERATION DURING TEST	37
6.1.6. TEST RESULTS	38
7 . HOPPING CHANNEL SEPARATION MEASUREMENT	40
7.1 APPLIED PROCEDURES / LIMIT	40
7.1.1 MEASUREMENT INSTRUMENTS LIST AND SETTING	40
7.1.2 TEST PROCEDURE	40
7.1.3 DEVIATION FROM STANDARD	40
7.1.4 TEST SETUP	40
7.1.5 EUT OPERATION CONDITIONS	40
7.1.6 TEST RESULTS	41
8 . BANDWIDTH TEST	42
8.1 APPLIED PROCEDURES / LIMIT	42
8.1.1 MEASUREMENT INSTRUMENTS LIST AND SETTING	42
8.1.2 TEST PROCEDURE	42
8.1.3 DEVIATION FROM STANDARD	42
8.1.4 TEST SETUP	42
8.1.5 EUT OPERATION CONDITIONS	42
8.1.6 TEST RESULTS	43
9 . PEAK OUTPUT POWER TEST	45
9.1 APPLIED PROCEDURES / LIMIT	45
9.1.1 MEASUREMENT INSTRUMENTS LIST AND SETTING	45
9.1.2 TEST PROCEDURE	45
9.1.3 DEVIATION FROM STANDARD	45
9.1.4 TEST SETUP	45
9.1.5 EUT OPERATION CONDITIONS	45
9.1.6 TEST RESULTS	46
10 . ANTENNA CONDUCTED SPURIOUS EMISSION	48
10.1 APPLIED PROCEDURES / LIMIT	48
10.1.1 MEASUREMENT INSTRUMENTS LIST AND SETTING	48
10.1.2 TEST PROCEDURE	48
10.1.3 DEVIATION FROM STANDARD	48
10.1.4 TEST SETUP	48
10.1.5 EUT OPERATION CONDITIONS	48



Table of Contents	Page
10.1.6 TEST RESULTS	49
11 . EUT TEST PHOTO	55



1. CERTIFICATION

Equipment : 2.4GHz Wireless Desktop with Optical Mouse

Brand Name : N/A

Model Name : JM-889G24;JM-890G24;KB5150W

Applicant: VSO TECHNOLOGY (DONG GUAN) CO.,LTD.

Date of Test : Feb. 08, 2011 ~ Feb. 10, 2011

Test Item: ENGINEERING SAMPLE

Standards: FCC Part15, Subpart C(15.247) / 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-1-1101C209) 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 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	-	Note(1)
15.247(d)	Antenna conducted Spurious Emission	PASS	
15.247 (a)(1)	Hopping Channel Separation	PASS	
15.247 (b)(1)	Peak Output Power	PASS	
15.247(d) 15.209	Radiated Spurious Emission	PASS	
15.247 (a)(1)(iii)	Number of Hopping Frequency	PASS	
15.247 (a)(1)(iii)	Dwell Time	PASS	
15.205	Restricted Bands	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 **DG-C02/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-C02	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	



3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	2.4GHz Wireless Desktop with Optical Mouse	
Trade Name	N/A	
Model Name	JM-889G24;JM-890G24;KB5150W	
OEM Brand/Model Name	N/A	
Model Difference	The models are designed based on similar electrical circuit but different aspect of enclosure.	
Product Description	The EUT is a 2.4GHz Wireless Desktop with Optical Mouse	
	Operation Frequency:	2403~2479 MHz
	Modulation Type:	GFSK
	Number Of Channel	39CH .Please see Note 2.
	Antenna Designation:	Please see Note 3.
	Antenna Gain(Peak)	Please see Note 3.
	Output Power:	-11.06 dBm
	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	DC Voltage supplied from 2*AAA Size battery	
Power Rating	DC 3.0V	
Connecting I/O Port(s)	Please refer to the User's Manual	
Products Covered	N/A	

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	2403	14	2429	27	2455
02	2405	15	2431	28	2457
03	2407	16	2433	29	2459
04	2409	17	2435	30	2461
05	2411	18	2437	31	2463
06	2413	19	2439	32	2465
07	2415	20	2441	33	2467
08	2417	21	2443	34	2469
09	2419	22	2445	35	2471
10	2421	23	2447	36	2473
11	2423	24	2449	37	2475
12	2425	25	2451	38	2477
13	2427	26	2453	39	2479

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Printed Antenna	N/A	1.89



3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base 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 - 2403 MHz
Mode 2	CH Middle - 2441 MHz
Mode 3	CH Highest -2479 MHz

For Conducted Emission	
Final Test Mode	Description
-	" N/A" denotes test is not applicable in this Test Report

For Radiated Emission	
Final Test Mode	Description
Mode 1	CH Lower - 2403 MHz
Mode 2	CH Middle - 2441 MHz
Mode 3	CH Highest -2479 MHz

Note:

(1) The measurements are performed at the highest, middle, lowest available channels.

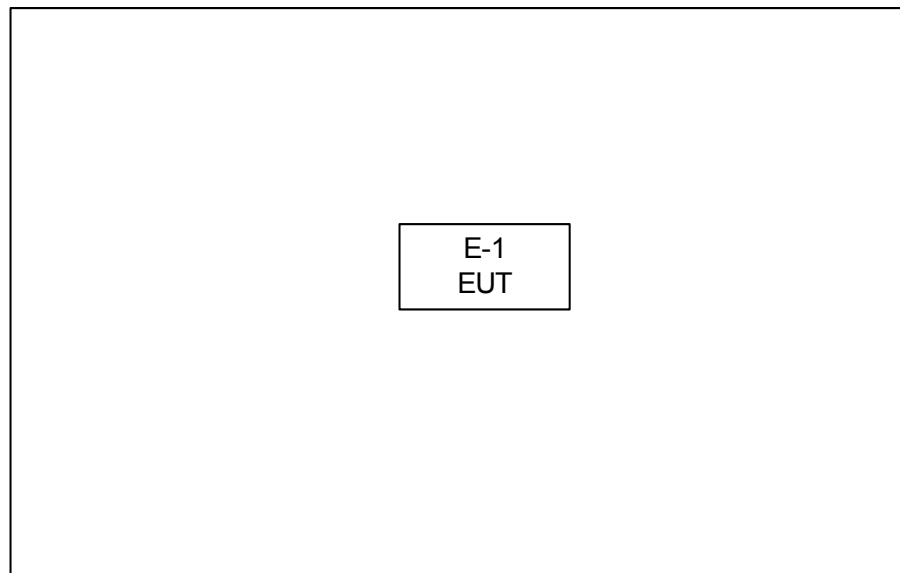
3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of FHSS

Test software Version	Test program: Hardware control		
Frequency	2403MHz	2441 MHz	2479 MHz
Parameters(GFSK)	N/A	N/A	N/A



3.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED





3.5 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

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	2.4GHz Wireless Desktop with Optical Mouse	N/A	JM-889G24	YLDJRB11	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note

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 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.26.2011
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.15.2011
6	EMI TEST RECEIVER	R&S	ESCS30	8333641017	May.26.2011

Remark: " N/A" denotes No Model No. , 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

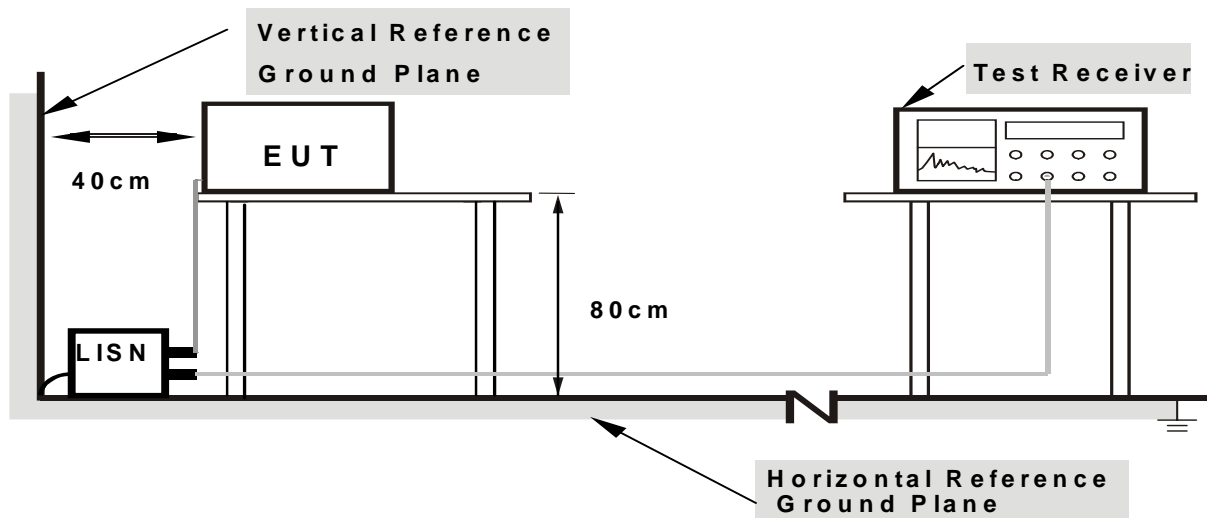
4.1.3 TEST PROCEDURE

- 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 :	2.4GHz Wireless Desktop with Optical Mouse	Model Name :	JM-889G24
Temperature :	--	Relative Humidity :	--
Pressure :	--	Test Power :	--
Test Mode :	"N/A" denotes test is not applicable in this Test Report		

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.
- (3) "N/A" denotes test is not applicable in this Test Report



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 th 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	ETS	3115	00075789	May.12.2011
2	Amplifier	Agilent	8449B	3008A02274	May.26.2011
3	Spectrum	Agilent	E4408B	US39240143	Nov.15.2011
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	May.26.2011
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



4.2.3 TEST PROCEDURE

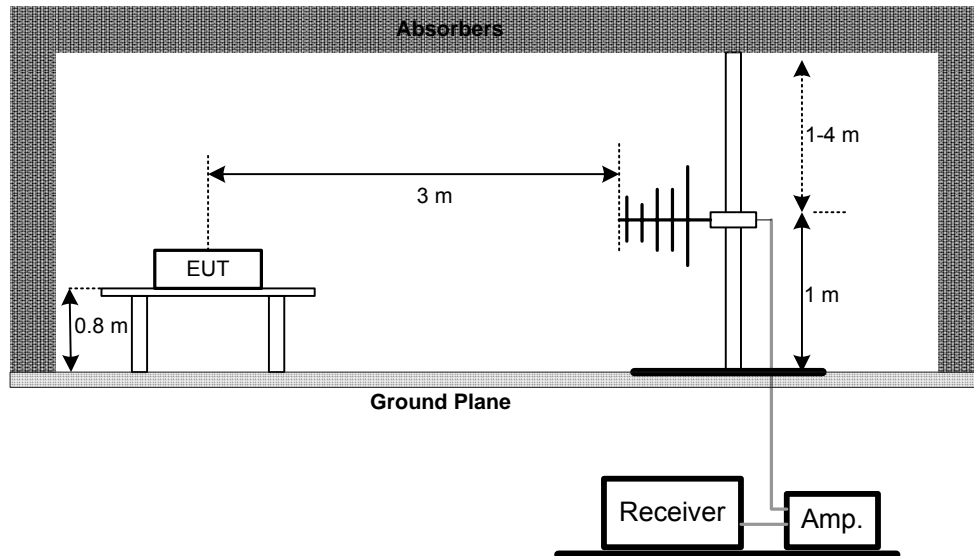
- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated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

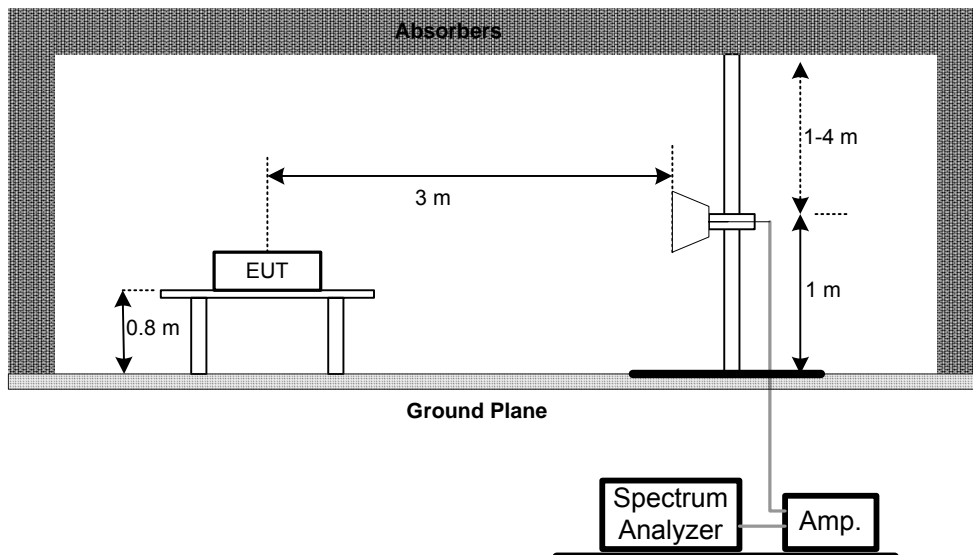
No deviation

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.



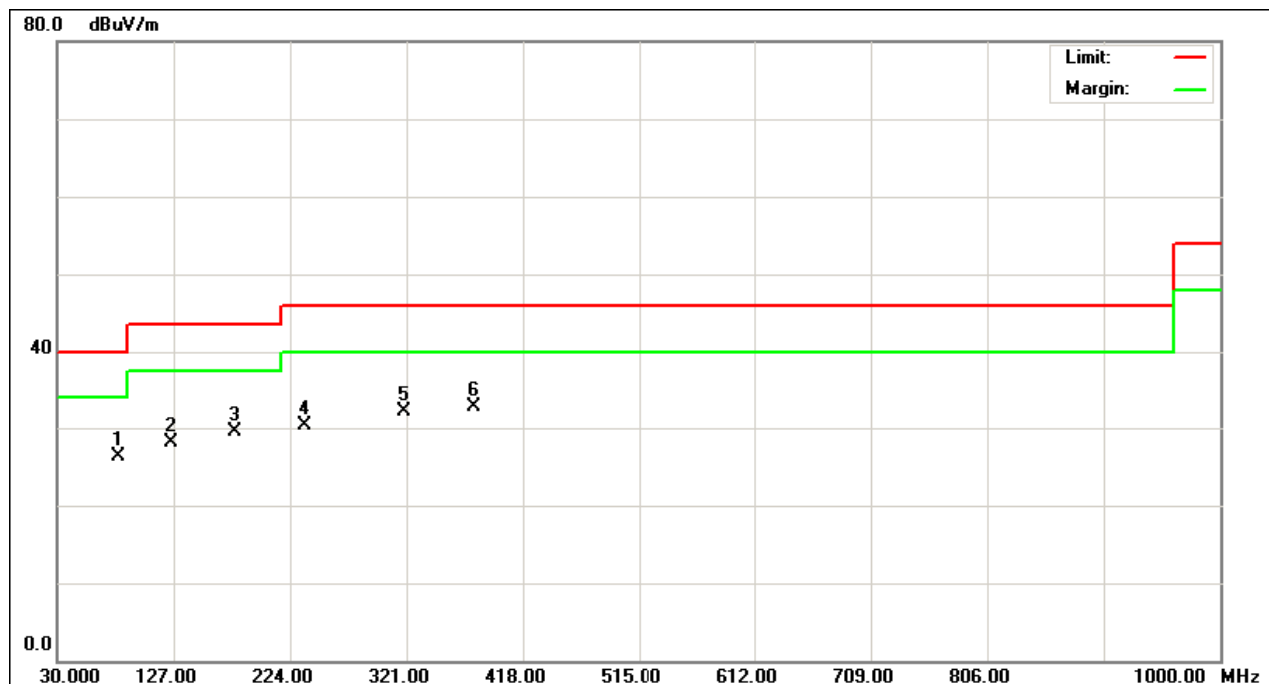
4.2.7 TEST RESULTS (BETWEEN 30 – 1000 MHZ)

EUT :	2.4GHz Wireless Desktop with Optical Mouse	Model Name :	JM-889G24
Temperature :	23 °C	Relative Humidity :	58 %
Pressure :	1001 hPa	Test Power :	DC 3.0V
Test Mode :	TX Mode 2403MHz		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
78.64	V	45.35	-19.00	26.35	40.00	- 13.65	
123.62	V	46.23	-18.22	28.01	43.50	- 15.49	
176.34	V	46.59	-17.04	29.55	43.50	- 13.95	
235.06	V	45.59	-15.38	30.21	46.00	- 15.79	
318.95	V	43.67	-11.60	32.07	46.00	- 13.93	
376.49	V	42.61	-9.87	32.74	46.00	- 13.26	

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 ◦



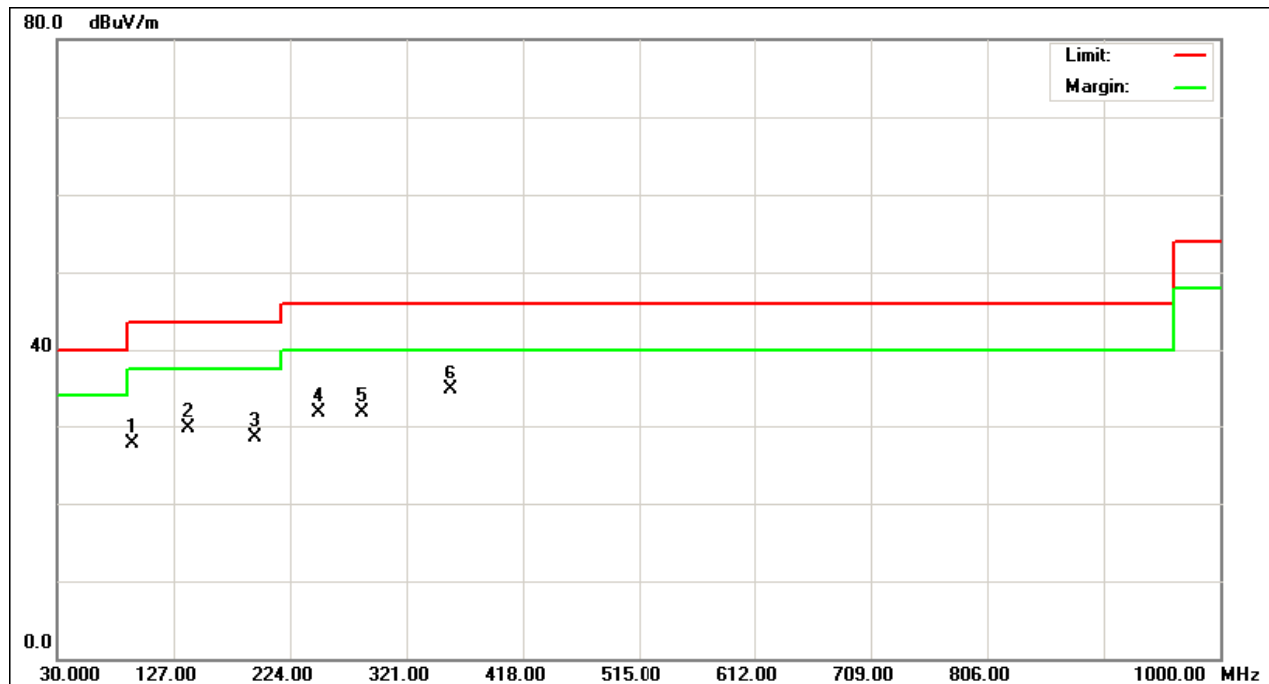


EUT :	2.4GHz Wireless Desktop with Optical Mouse	Model Name :	JM-889G24
Temperature :	23 °C	Relative Humidity :	58 %
Pressure :	1001 hPa	Test Power :	DC 3.0V
Test Mode :	TX Mode 2403MHz		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
91.27	H	46.61	-18.91	27.70	43.50	- 15.80	
137.38	H	47.62	-17.84	29.78	43.50	- 13.72	
194.27	H	45.15	-16.67	28.48	43.50	- 15.02	
246.76	H	46.54	-14.76	31.78	46.00	- 14.22	
283.42	H	44.21	-12.44	31.77	46.00	- 14.23	
357.81	H	45.22	-10.56	34.66	46.00	- 11.34	

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 :	2.4GHz Wireless Desktop with Optical Mouse	Model Name :	JM-889G24
Temperature :	20 °C	Relative Humidity :	50 %
Pressure :	1001 hPa	Test Power :	DC 3.0V
Test Mode :	TX 2403MHz		

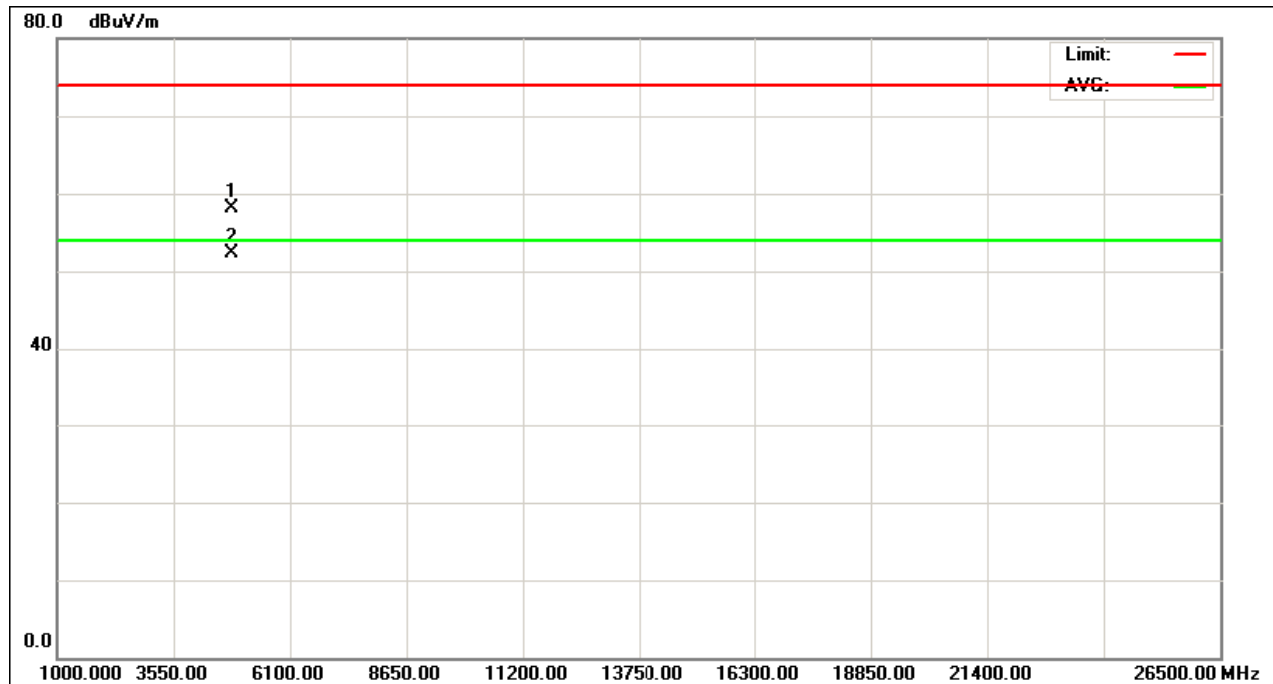
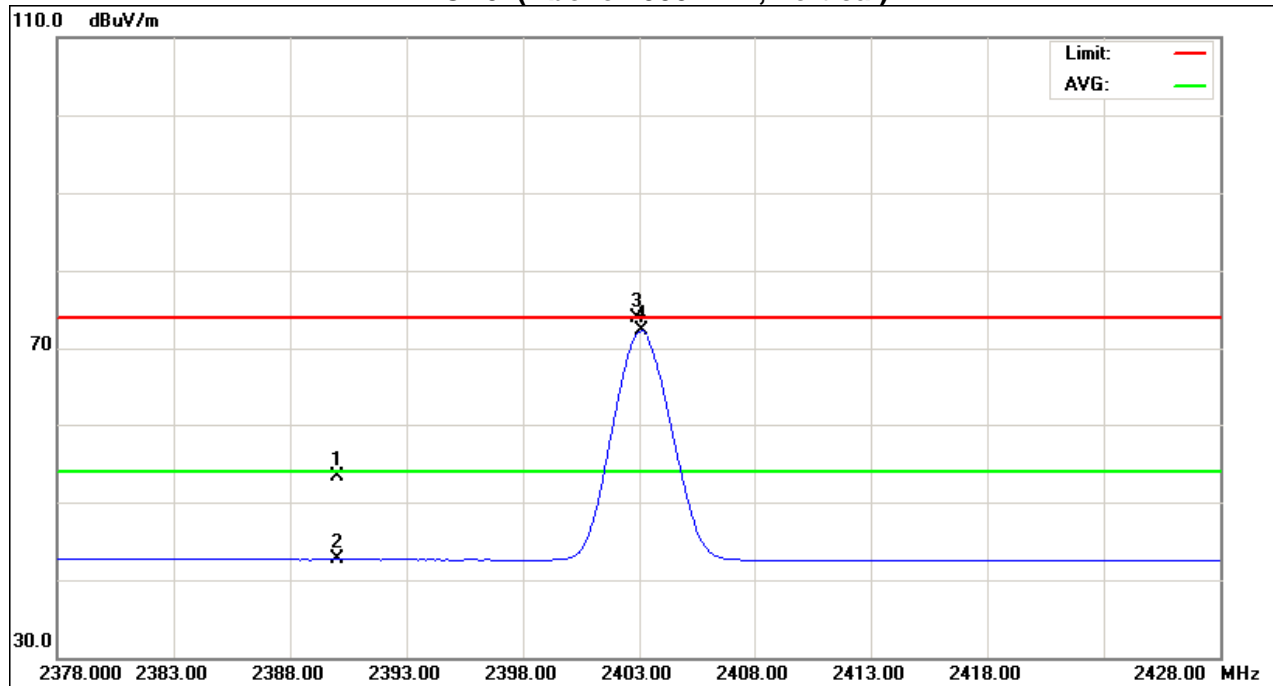
Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
2390.00	V	21.48	10.73	31.91	53.39	42.64	74.00	54.00	X/E
2402.90	V	42.03	40.32	31.89	73.92	72.21	114.00	94.00	X/F
4805.60	V	51.90	46.25	6.15	58.05	52.40	74.00	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



TX CH01(Above 1000 MHz, Vertical)





EUT :	2.4GHz Wireless Desktop with Optical Mouse	Model Name :	JM-889G24
Temperature :	20 °C	Relative Humidity :	50 %
Pressure :	1001 hPa	Test Power :	DC 3.0V
Test Mode :	TX 2403MHz		

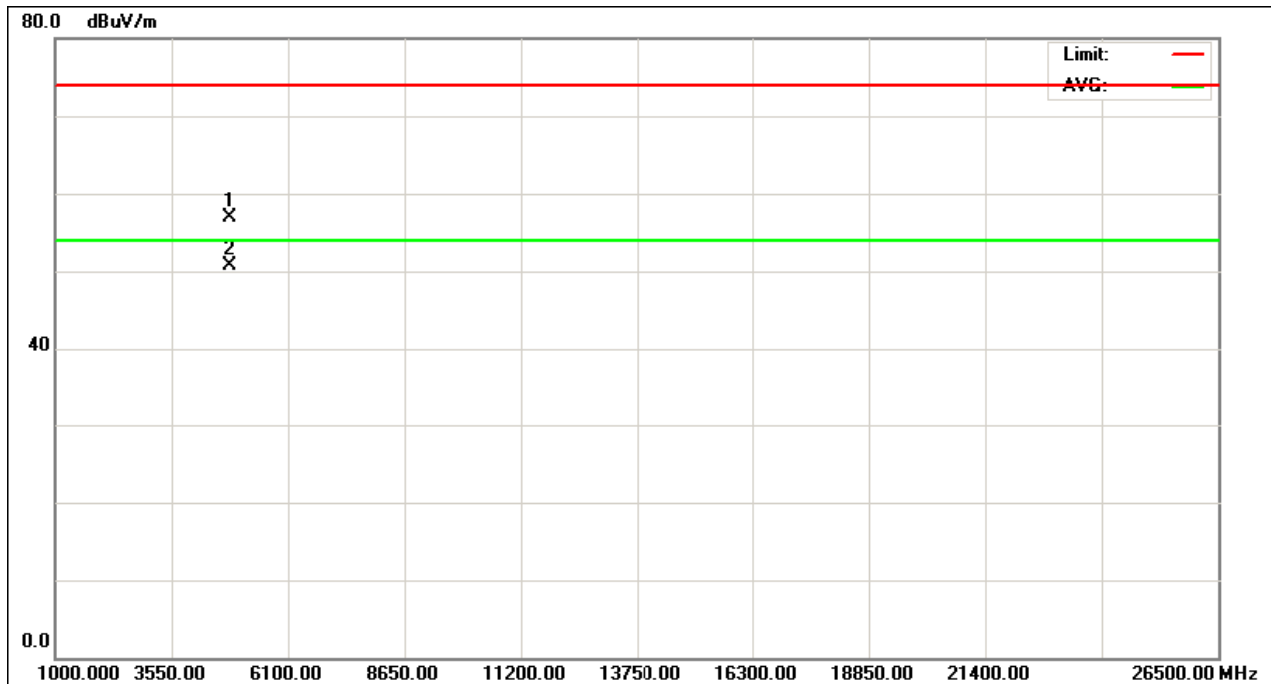
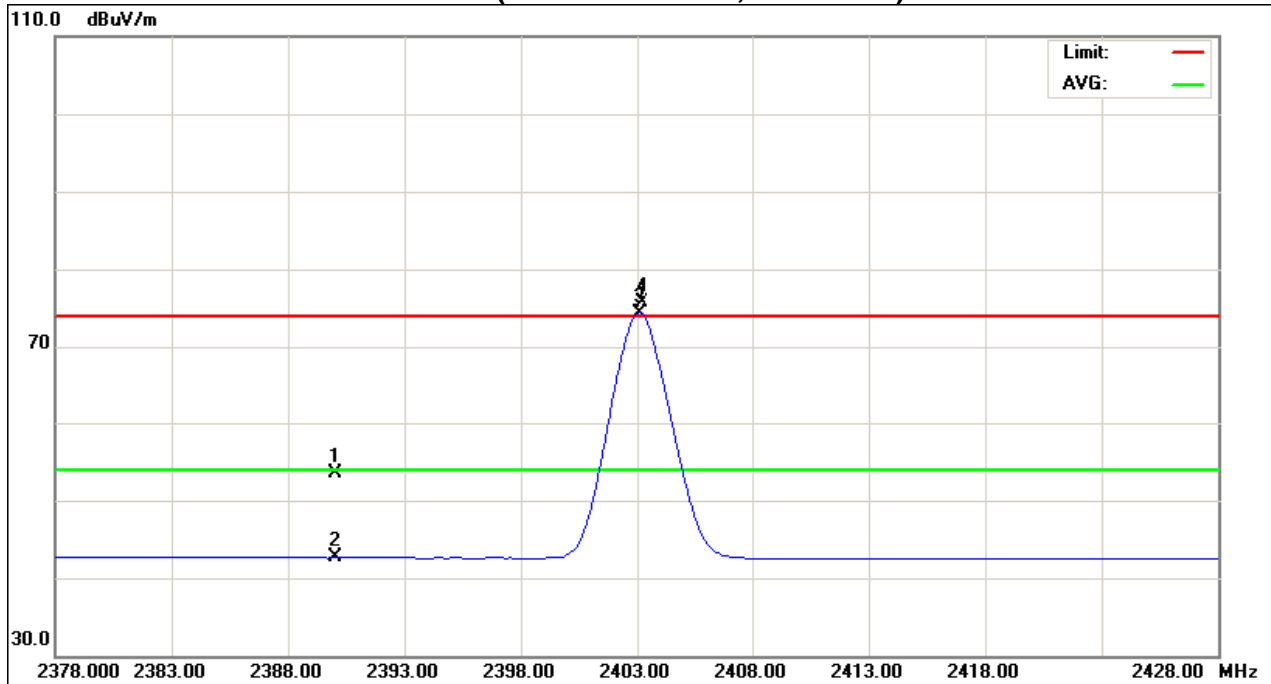
Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
2390.00	H	21.66	10.72	31.91	53.57	42.63	74.00	54.00	X/E
2403.10	H	43.87	42.50	31.89	75.76	74.39	114.00	94.00	X/F
4805.40	H	50.84	44.48	6.15	56.99	50.63	74.00	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



TX CH01(Above 1000 MHz, Horizontal)





EUT :	2.4GHz Wireless Desktop with Optical Mouse	Model Name :	JM-889G24
Temperature :	20 °C	Relative Humidity :	50 %
Pressure :	1001 hPa	Test Power :	DC 3.0V
Test Mode :	TX 2441MHz		

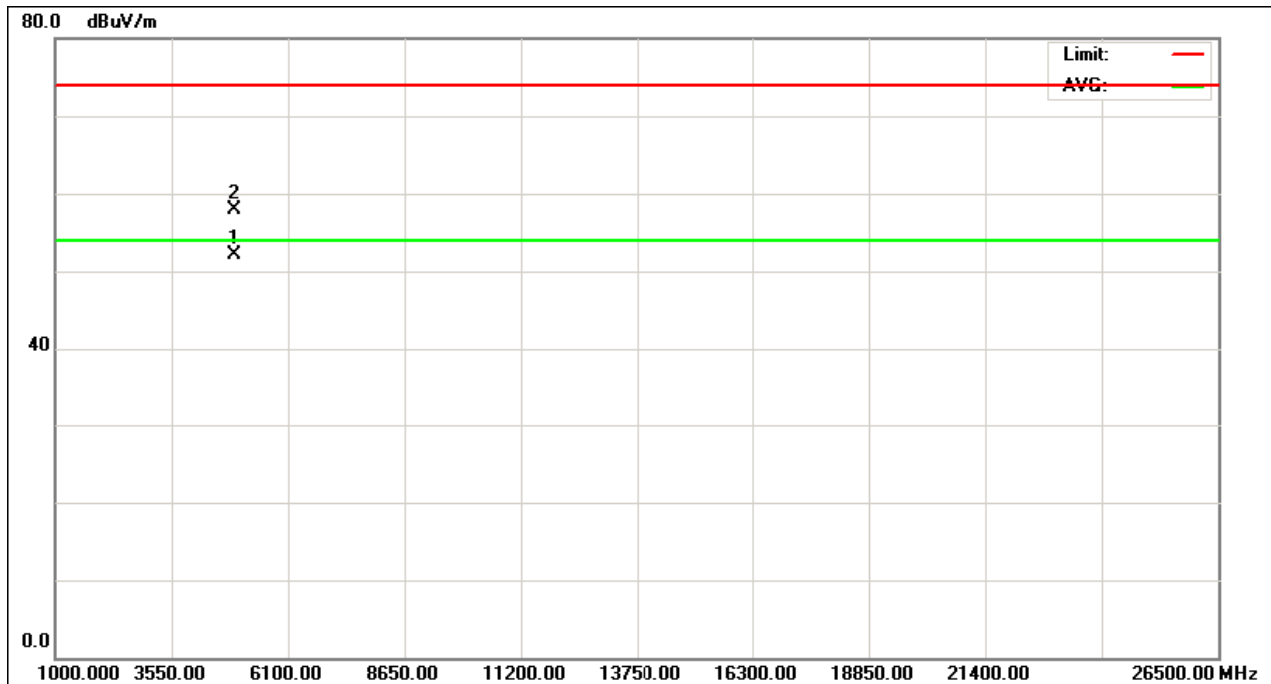
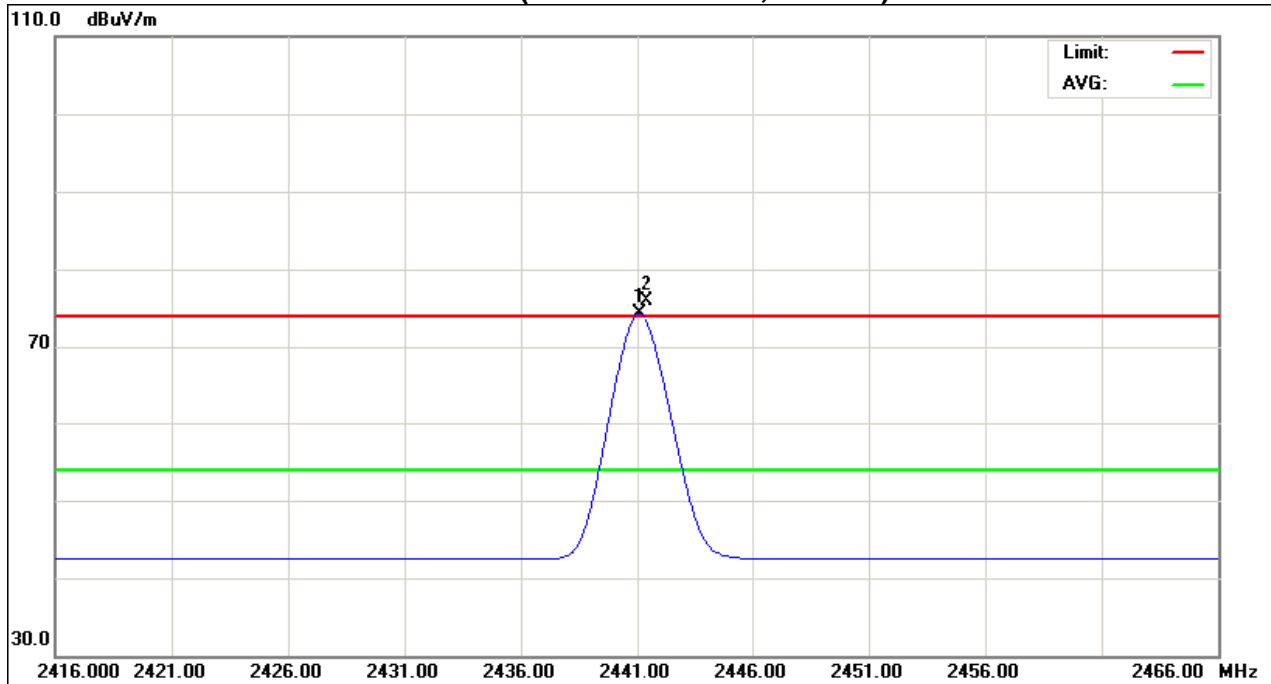
Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
2441.10	V	44.01	42.43	31.85	75.86	74.28	114.00	94.00	X/F
4882.20	V	51.29	45.50	6.52	57.81	52.02	74.00	54.00	X/H

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



TX CH20 (Above 1000 MHz, Vertical)





EUT :	2.4GHz Wireless Desktop with Optical Mouse	Model Name :	JM-889G24
Temperature :	20 °C	Relative Humidity :	50 %
Pressure :	1001 hPa	Test Power :	DC 3.0V
Test Mode :	TX 2441MHz		

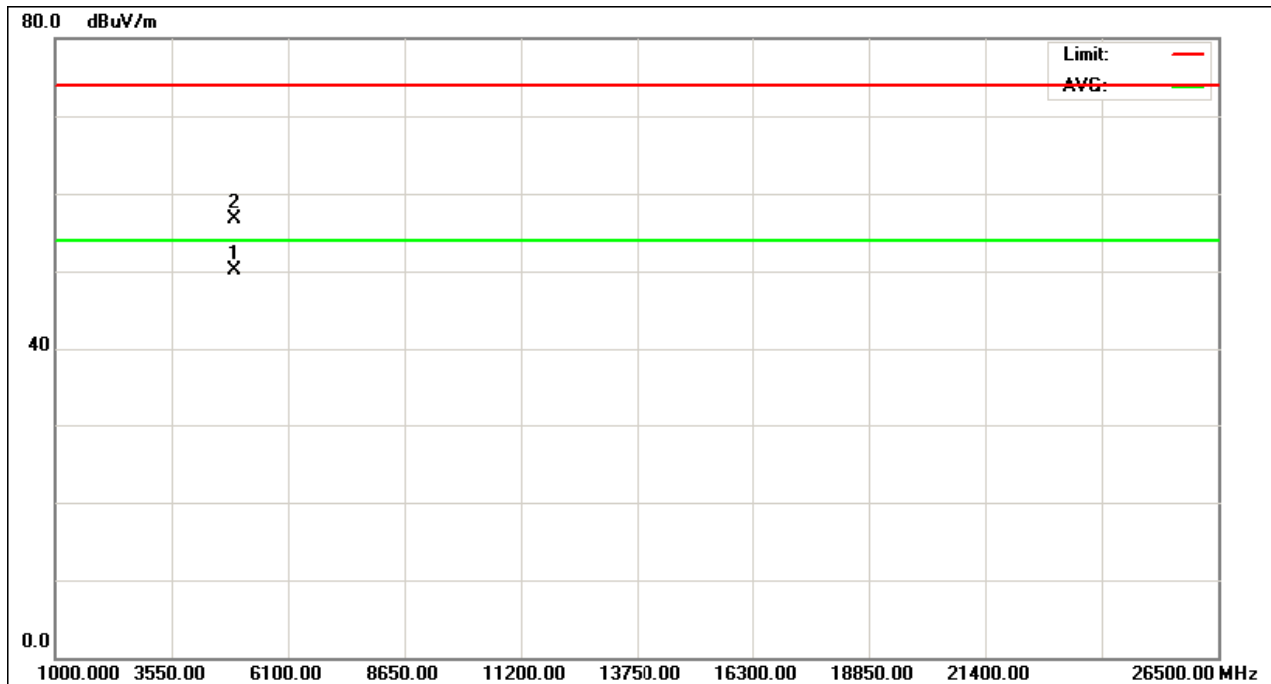
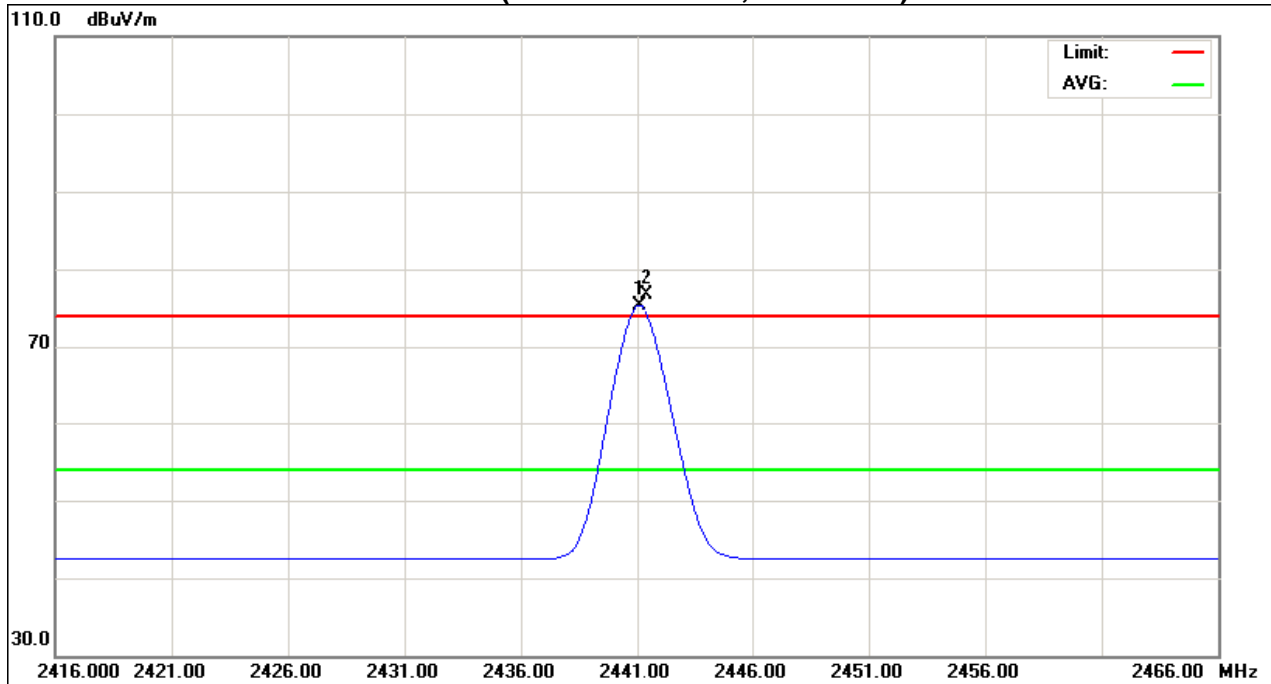
Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
2441.10	H	44.90	43.43	31.85	76.75	75.28	114.00	94.00	X/F
4882.20	H	50.11	43.63	6.52	56.63	50.15	74.00	54.00	X/H

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



TX CH20 (Above 1000 MHz, Horizontal)





EUT :	2.4GHz Wireless Desktop with Optical Mouse	Model Name :	JM-889G24
Temperature :	20 °C	Relative Humidity :	50 %
Pressure :	1001 hPa	Test Power :	DC 3.0V
Test Mode :	TX 2479MHz		

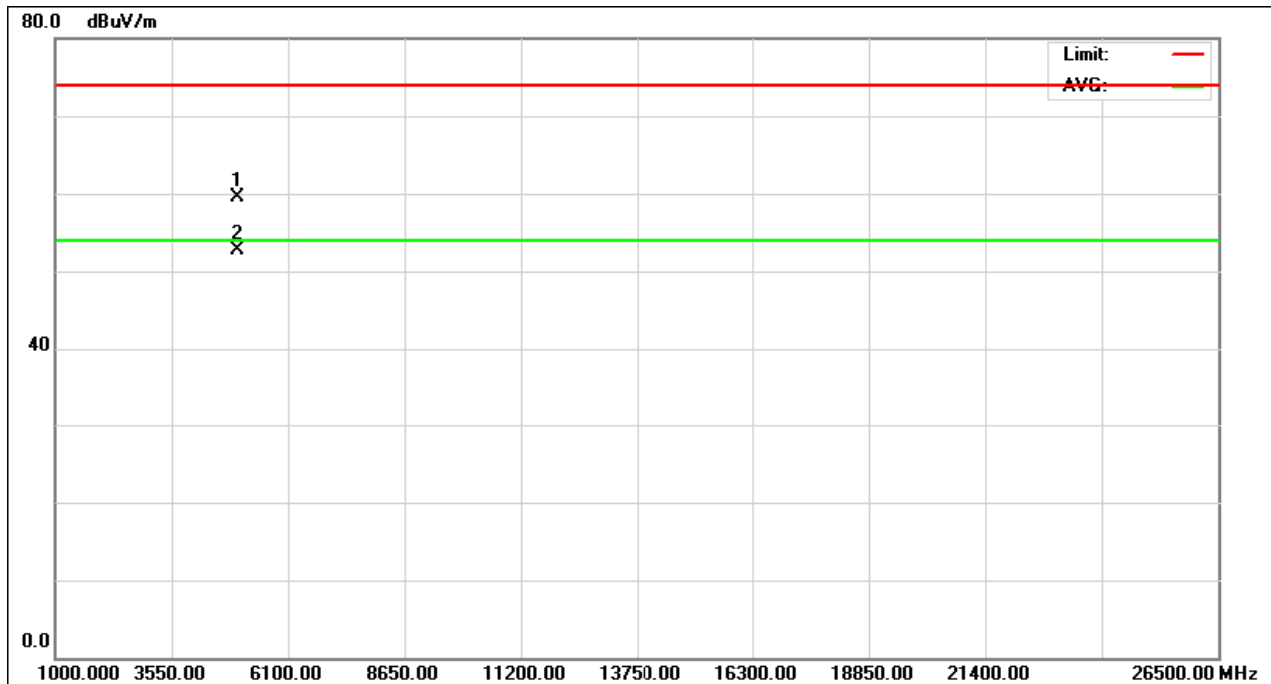
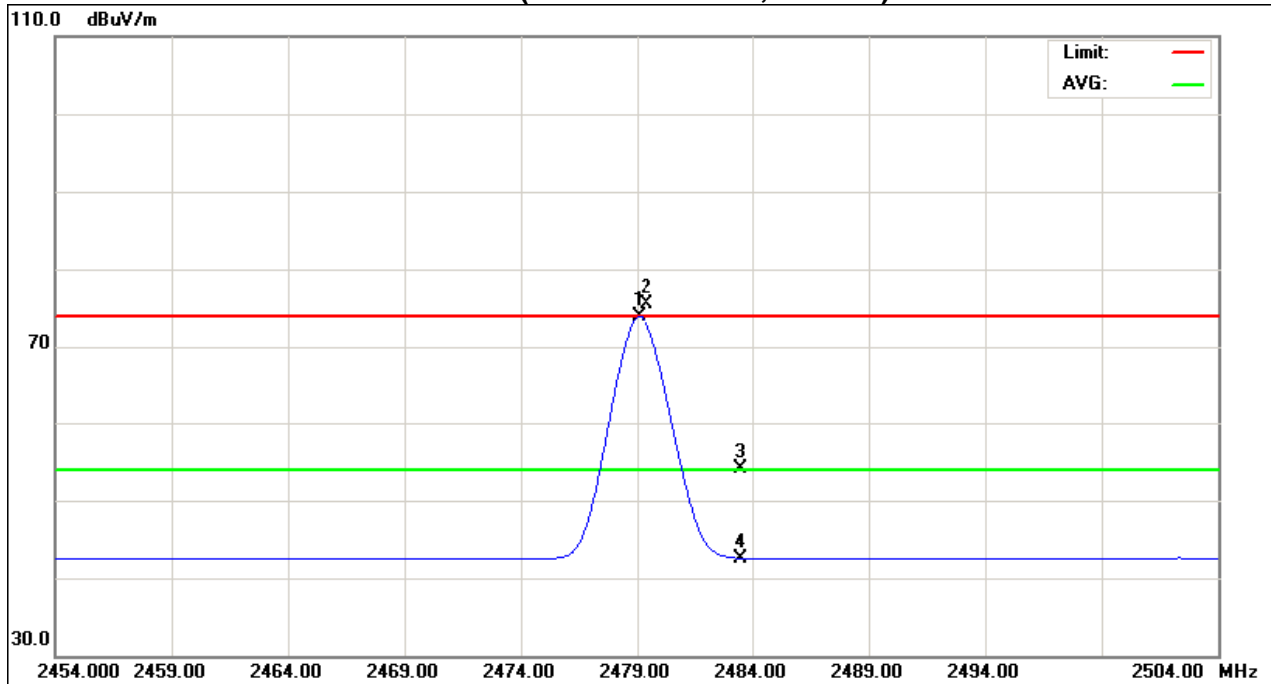
Freq. (MHz)	Ant. Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
2479.10	V	43.68	42.06	31.80	75.48	73.86	114.00	94.00	X/F
2483.50	V	22.29	10.76	31.80	54.09	42.56	74.00	54.00	X/E
4957.40	V	52.60	45.84	6.88	59.48	52.72	74.00	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



TX CH39 (Above 1000 MHz, Vertical)





EUT :	2.4GHz Wireless Desktop with Optical Mouse	Model Name :	JM-889G24
Temperature :	20 °C	Relative Humidity :	50 %
Pressure :	1001 hPa	Test Power :	DC 3.0V
Test Mode :	TX 2479MHz		

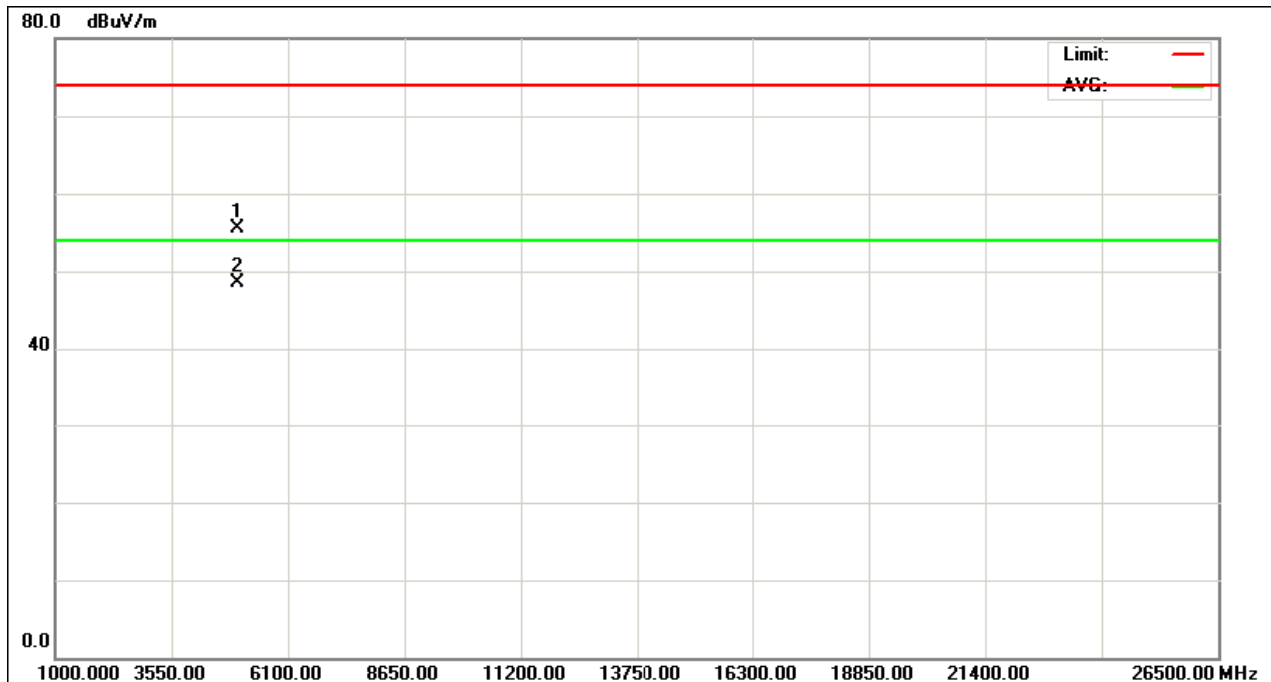
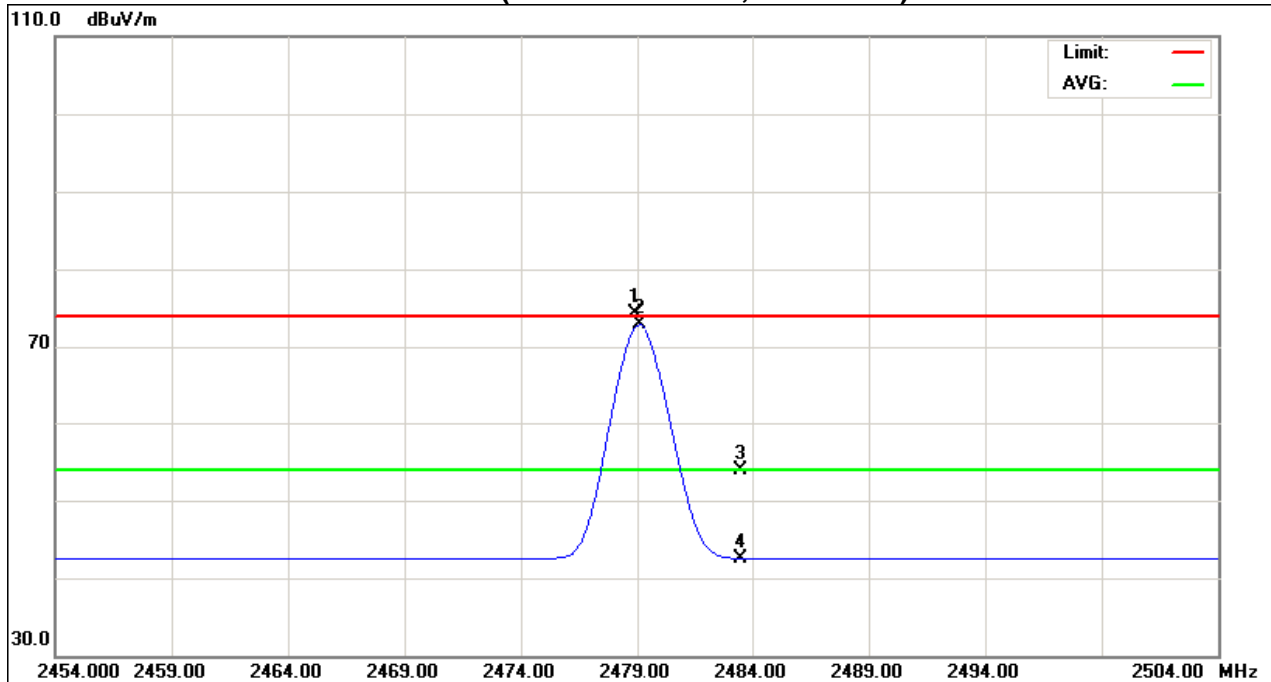
Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
2479.10	H	42.59	41.03	31.80	74.39	72.83	114.00	94.00	X/F
2483.50	H	22.11	10.73	31.80	53.91	42.53	74.00	54.00	X/E
4957.40	H	48.64	41.69	6.88	55.52	48.57	74.00	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



TX CH39 (Above 1000 MHz, Horizontal)





5. NUMBER OF HOPPING CHANNEL

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C			
Section	Test Item	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Number of Hopping Channel	2400-2483.5	PASS

5.1.1 MEASUREMENT INSTRUMENTS LIST AND SETTING

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov.26.2011

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

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating Frequency Range
RB	100 kHz
VB	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

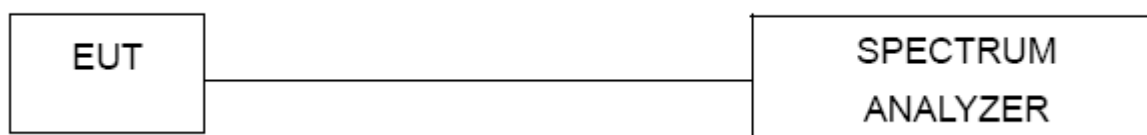
5.1.2 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- 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

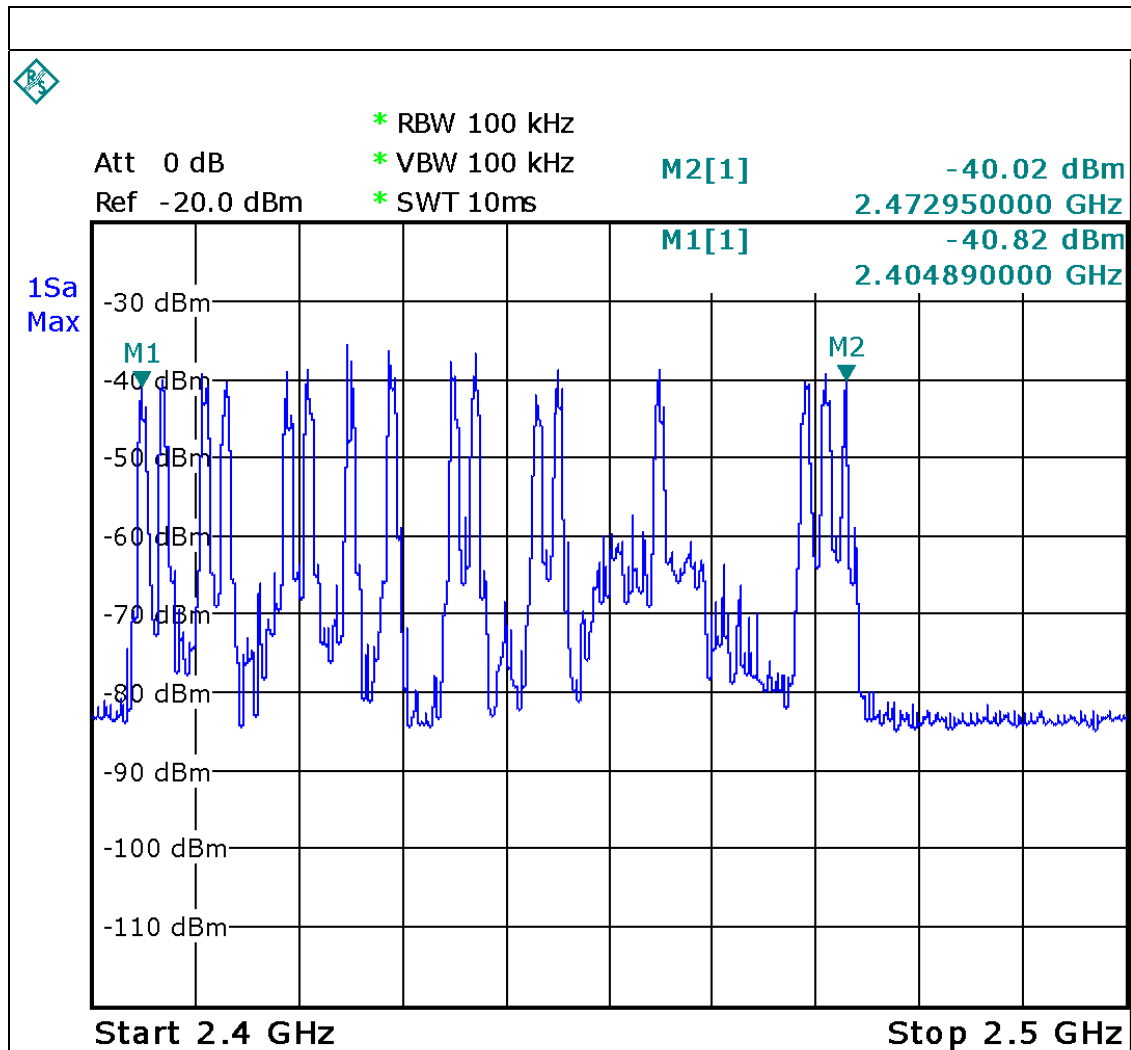
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.



5.1.6 TEST RESULTS

EUT :	2.4GHz Wireless Desktop with Optical Mouse	Model Name :	JM-889G24
Temperature :	20 °C	Relative Humidity :	51 %
Pressure :	1001 hPa	Test Power :	DC 3.0V
Test Mode :	Hopping Mode – Random Total 16 Hopping channel/time		

Number of Hopping Channel	16
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6. AVERAGE TIME OF OCCUPANCY

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Average Time of Occupancy	0.4sec	2400-2483.5	PASS

6.1.1 MEASUREMENT INSTRUMENTS LIST

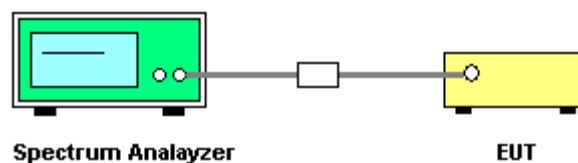
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov.26.2011

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

6.1.2. TEST PROCEDURES

- The transmitter output (antenna port) was connected to the spectrum analyzer
- Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
- Use a video trigger with the trigger level set to enable triggering only on full pulses.
- Sweep Time is more than once pulse time.
- Set the center frequency on any frequency would be measure and set the frequency span to zero span.
- Measure the maximum time duration of one single pulse.
- Set the EUT for packet transmitting.
- Measure the maximum time duration of one single pulse.
- Dwell time = [spreading rate/39] x duty-cycle x 0.4 seconds

6.1.3. TEST SETUP LAYOUT



6.1.4. TEST DEVIATION

There is no deviation with the original standard.

6.1.5. EUT OPERATION DURING TEST

The EUT was programmed to be in continuously transmitting/Hopping mode.



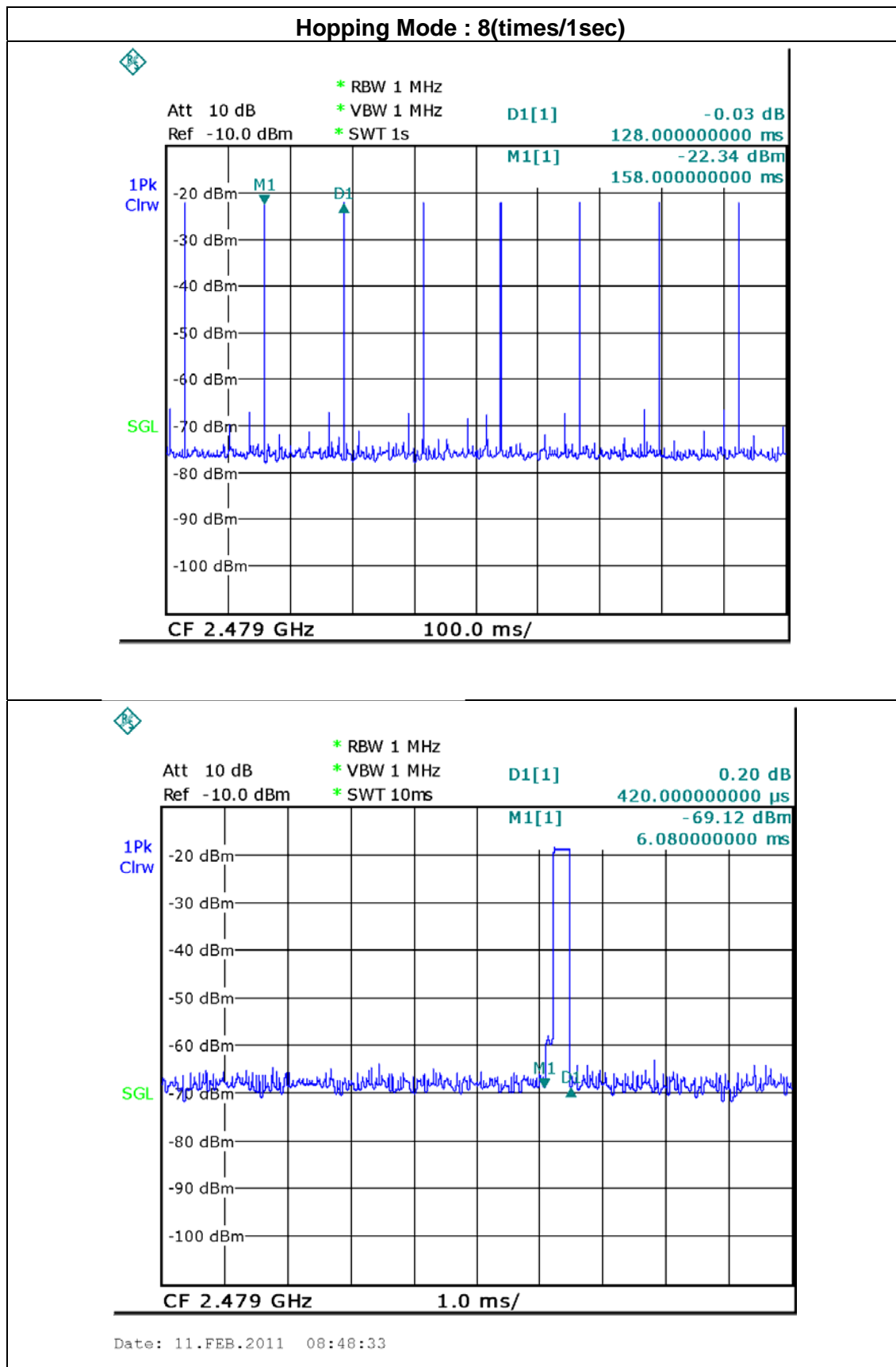
6.1.6. TEST RESULTS

EUT :	2.4GHz Wireless Desktop with Optical Mouse	Model Name :	JM-889G24
Temperature :	20 °C	Relative Humidity :	51 %
Pressure :	1001 hPa	Test Power :	DC 3.0V
Test Mode :	Hopping Mode		

Mode	Number of transmission in a 6.4 (16Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
2406.2 MHz	(8/1) *6.4=51.2 times Note1	0.42	21.504	400

Note1: 8 times of occupied channels per 1 second

	Results
Measured cycle (sec)	16 CH*0.4=6.4
The total number of frequency-hopping per second	(8/1)*16=128
The number of occupied channels per second	128/16=8(number/sec)
occupied time for each channel(1)	0.420ms
The total number of channels occupied within one cycle (2)	(8/1) *6.4=51.2 times
The average time of occupancy within one cycle(1)*(2)	21.504msec
LIMIT (msec)	400msec



7. HOPPING CHANNEL SEPARATION MEASUREMENT

7.1 APPLIED PROCEDURES / LIMIT

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

7.1.1 MEASUREMENT INSTRUMENTS LIST AND SETTING

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov.26.2011

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

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

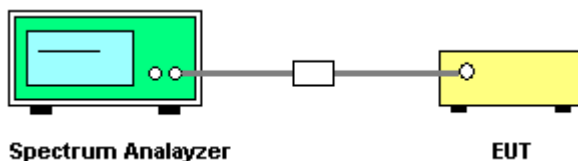
7.1.2 TEST PROCEDURE

- The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
- The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for 20 dB bandwidth measurement.
- The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for channel separation measurement.

7.1.3 DEVIATION FROM STANDARD

No deviation.

7.1.4 TEST SETUP



7.1.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

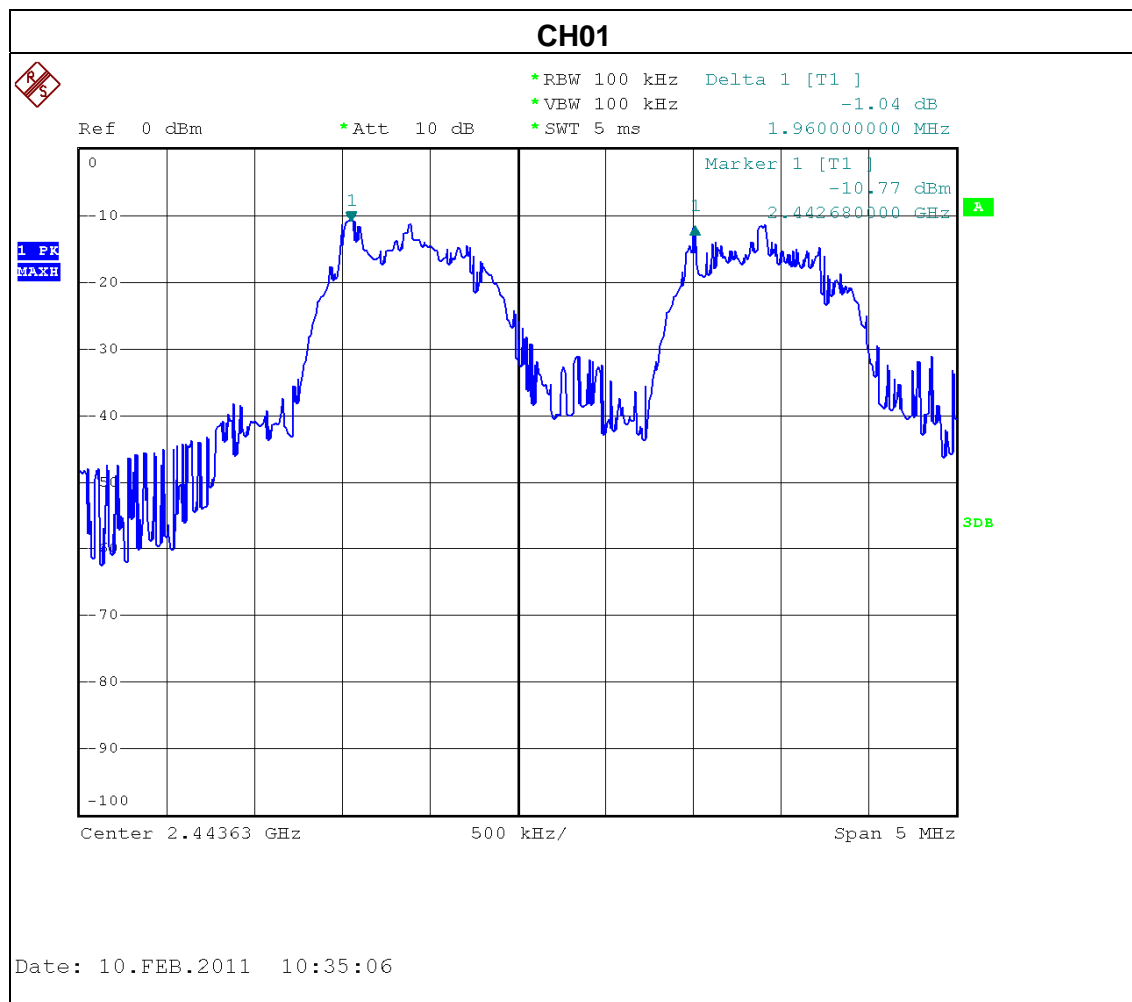


7.1.6 TEST RESULTS

EUT :	2.4GHz Wireless Desktop with Optical Mouse	Model Name :	JM-889G24
Temperature :	20 °C	Relative Humidity :	51 %
Pressure :	1001 hPa	Test Power :	DC 3.0V
Test Mode :	CH21		

Frequency	Ch. Separation (MHz)	20dB Bandwidth (MHz)	Result
2443 MHz	2	1.180	Complies

Ch. Separation Limits: >20dB bandwidth or >2/3 of 20dB bandwidth





8. BANDWIDTH TEST

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(2)	Bandwidth	None	2400-2483.5	PASS

8.1.1 MEASUREMENT INSTRUMENTS LIST AND SETTING

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov.26.2011

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

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

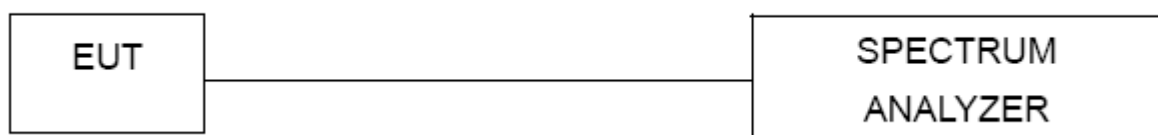
8.1.2 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 30KHz, VBW=100KHz, Sweep time = Auto.

8.1.3 DEVIATION FROM STANDARD

No deviation.

8.1.4 TEST SETUP



8.1.5 EUT OPERATION CONDITIONS

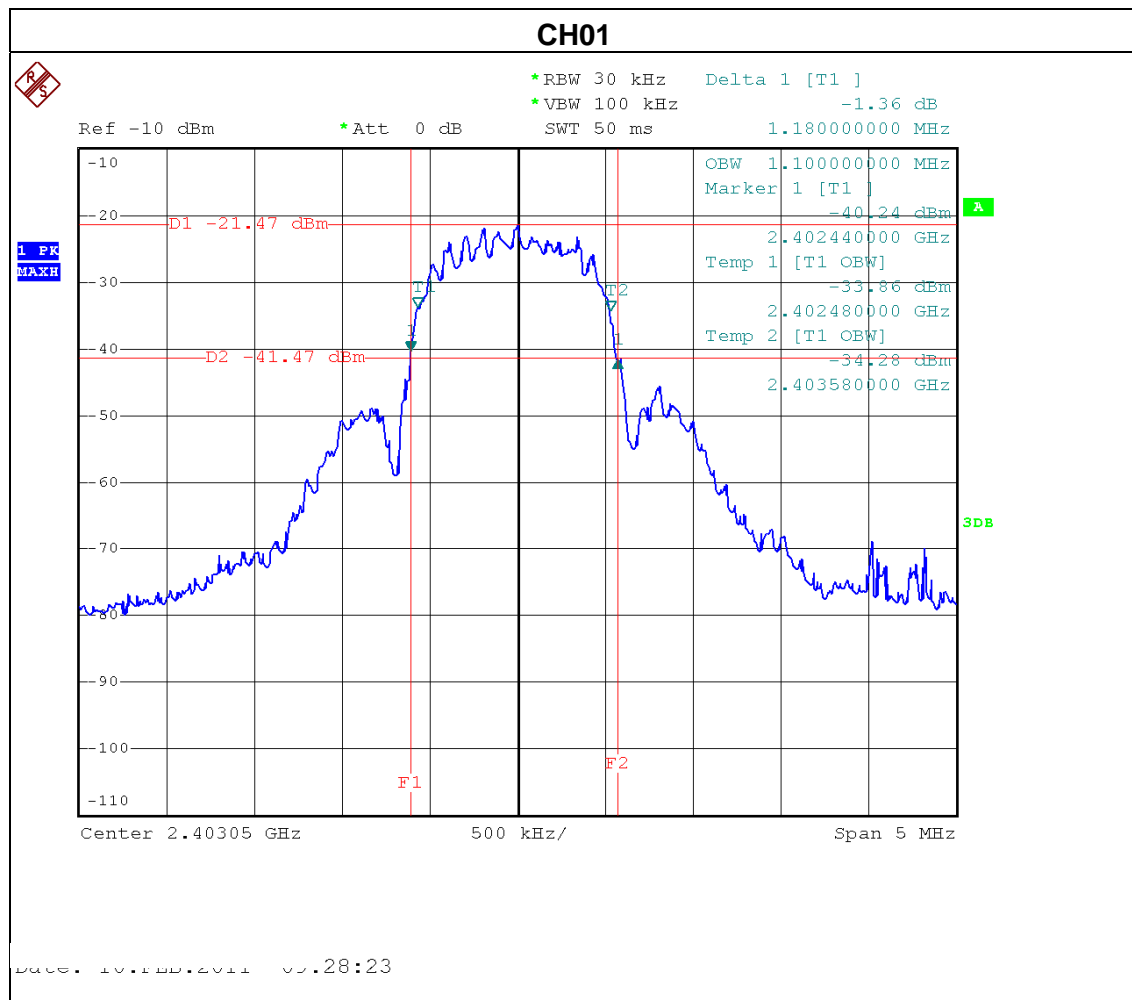
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.



8.1.6 TEST RESULTS

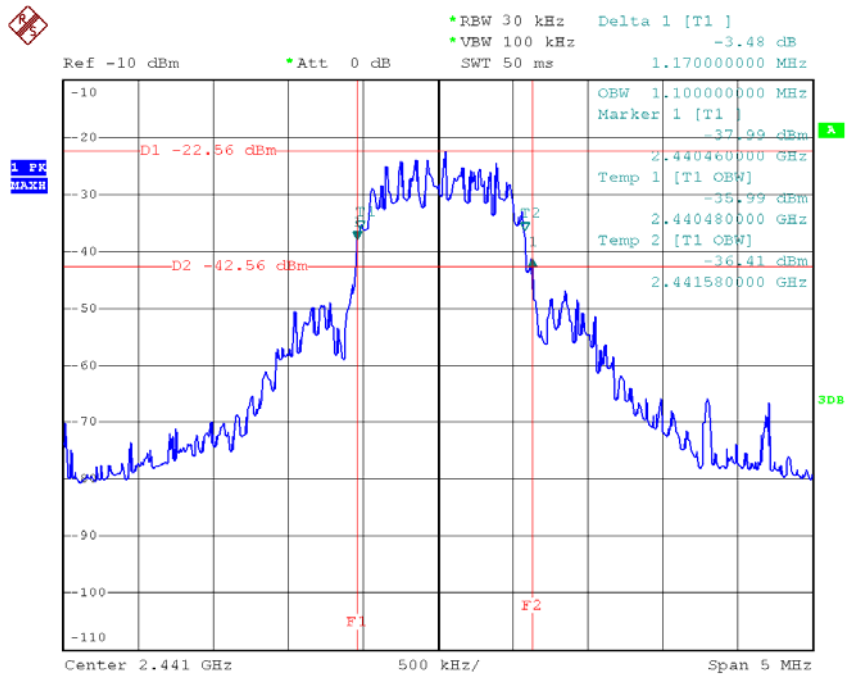
EUT :	2.4GHz Wireless Desktop with Optical Mouse	Model Name :	JM-889G24
Temperature :	20 °C	Relative Humidity :	51 %
Pressure :	1001 hPa	Test Power :	DC 3.0V
Test Mode :	CH01 / CH20 /CH39		

Frequency	20dB Bandwidth (MHz)	Channel Separation (MHz)	Result
2403 MHz	1.18	<= 2MHz	PASS
2441 MHz	1.17	<= 2MHz	PASS
2479 MHz	1.20	<= 2MHz	PASS



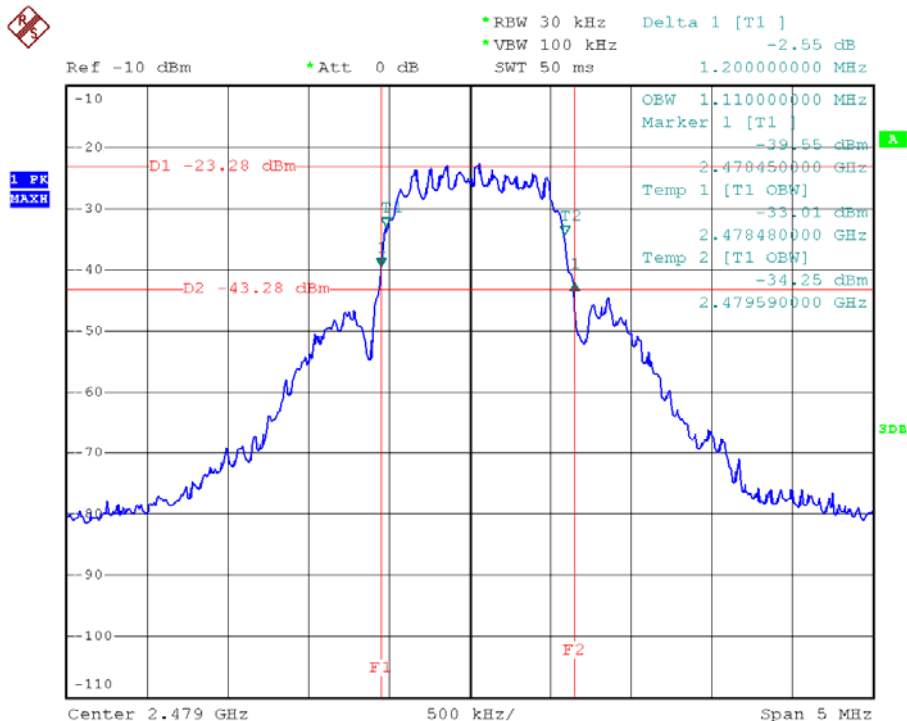


CH20



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CH39



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9. PEAK OUTPUT POWER TEST

9.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (b)(1)	Peak Output Power	0.125 watt or 21dBm	2400-2483.5	PASS

9.1.1 MEASUREMENT INSTRUMENTS LIST AND SETTING

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov.26.2011

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

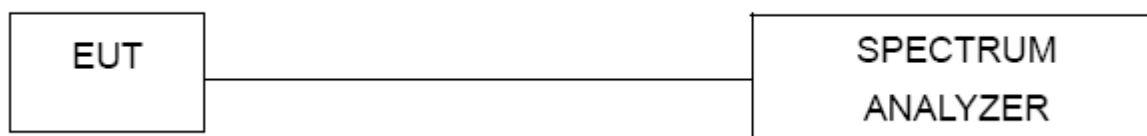
9.1.2 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 3MHz, VBW= 3MHz, Sweep time = Auto.

9.1.3 DEVIATION FROM STANDARD

No deviation.

9.1.4 TEST SETUP



9.1.5 EUT OPERATION CONDITIONS

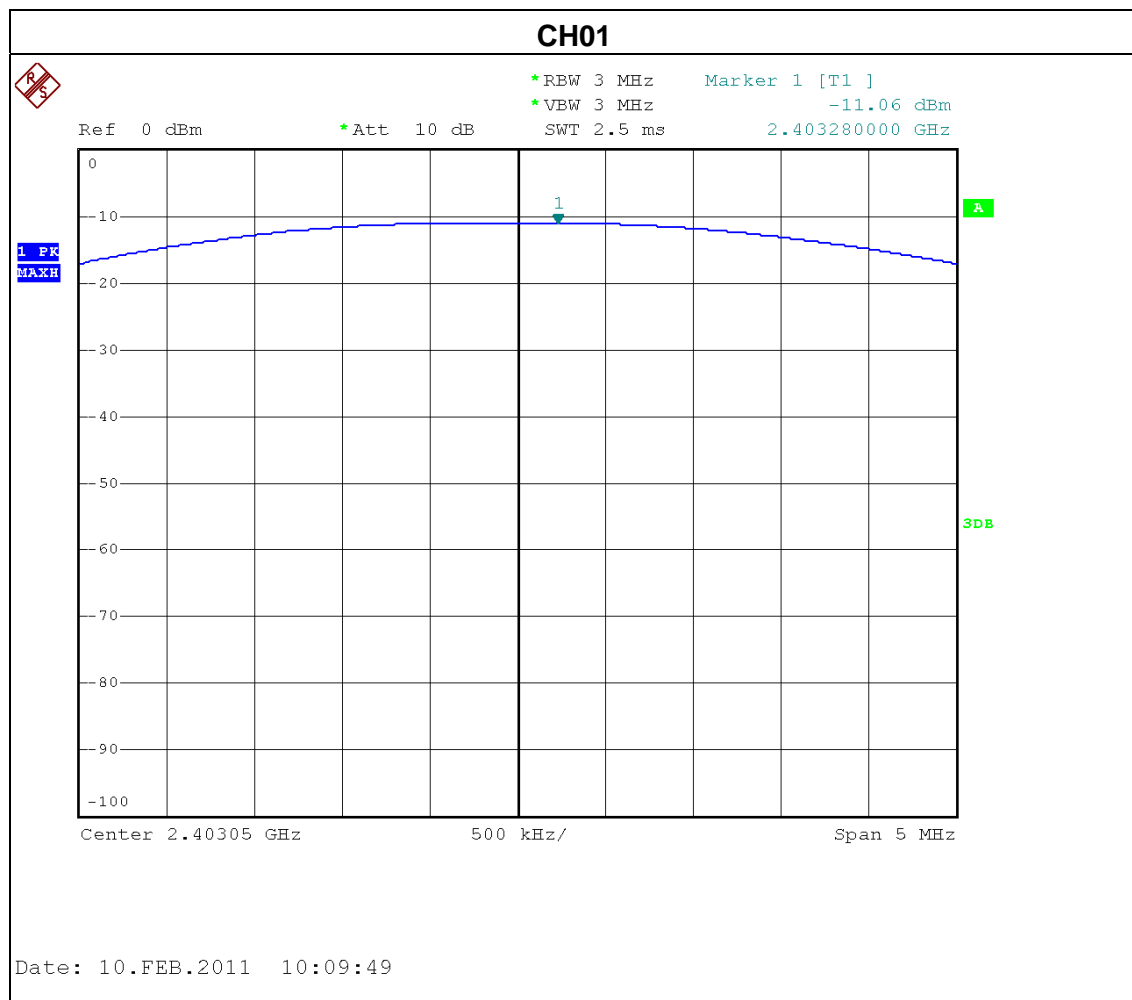
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.



9.1.6 TEST RESULTS

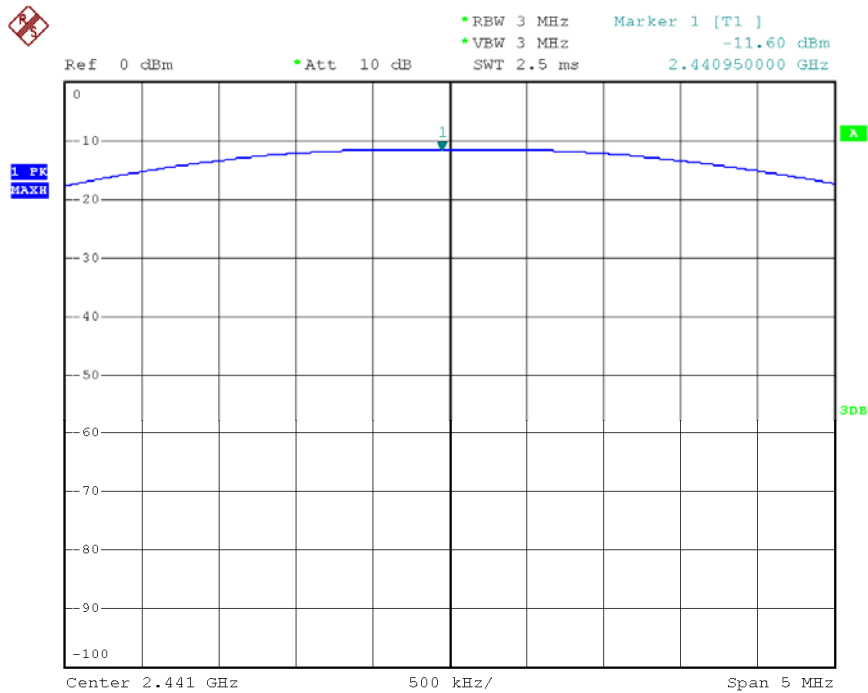
EUT :	2.4GHz Wireless Desktop with Optical Mouse	Model Name :	JM-889G24
Temperature :	20 °C	Relative Humidity :	51 %
Pressure :	1001 hPa	Test Power :	DC 3.0V
Test Mode :	CH01/ CH20 /CH39		

Test Channel	Frequency (MHz)	Peak Output Power (dBm)	LIMIT (dBm)	LIMIT (W)
CH01	2403	-11.06	21	0.125
CH20	2441	-11.60	21	0.125
CH39	2479	-12.18	21	0.125



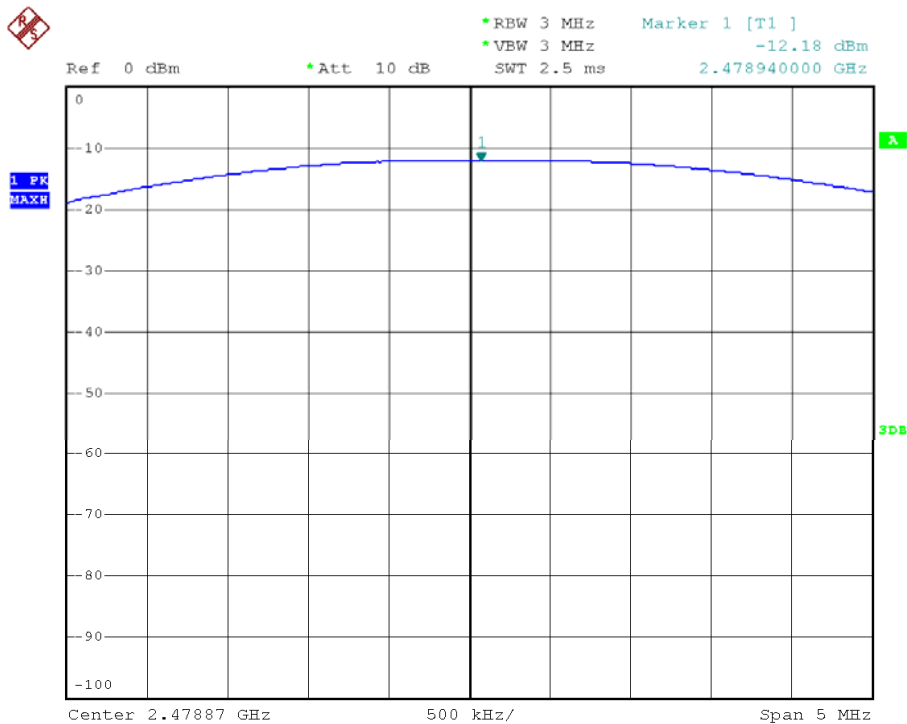


CH20



Date: 10.FEB.2011 09:58:26

CH39



Date: 10.FEB.2011 09:35:53



10. ANTENNA CONDUCTED SPURIOUS EMISSION

10.1 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

10.1.1 MEASUREMENT INSTRUMENTS LIST AND SETTING

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov.26.2011

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

10.1.2 TEST PROCEDURE

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

10.1.3 DEVIATION FROM STANDARD

No deviation.

10.1.4 TEST SETUP



10.1.5 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.



10.1.6 TEST RESULTS

EUT :	2.4GHz Wireless Desktop with Optical Mouse	Model Name :	JM-889G24
Temperature :	20 °C	Relative Humidity :	51 %
Pressure :	1001 hPa	Test Power :	DC 3.0V
Test Mode :	CH01 / CH20 / CH39 & Hopping Mode		

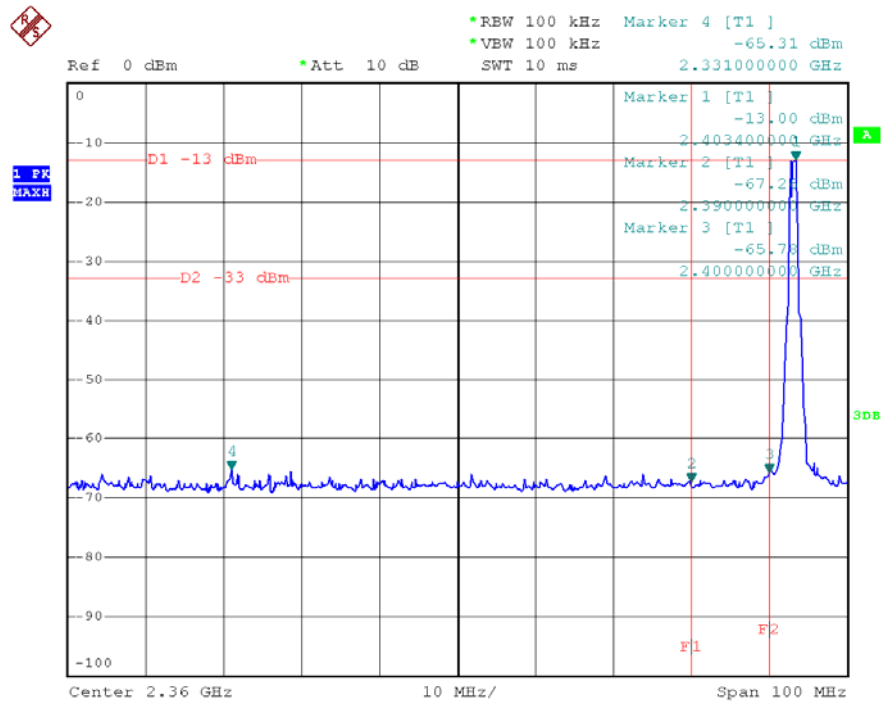
The max. radio frequency power in any 100kHz bandwidth outside the frequency band		The max. radio frequency power in any 100 kHz bandwidth within the frequency band.	
FREQUENCY(MHz)	POWER(dBm)	FREQUENCY(MHz)	POWER(dBm)
2400.00	-65.78	2490.67	-66.68

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 level of the desired power.

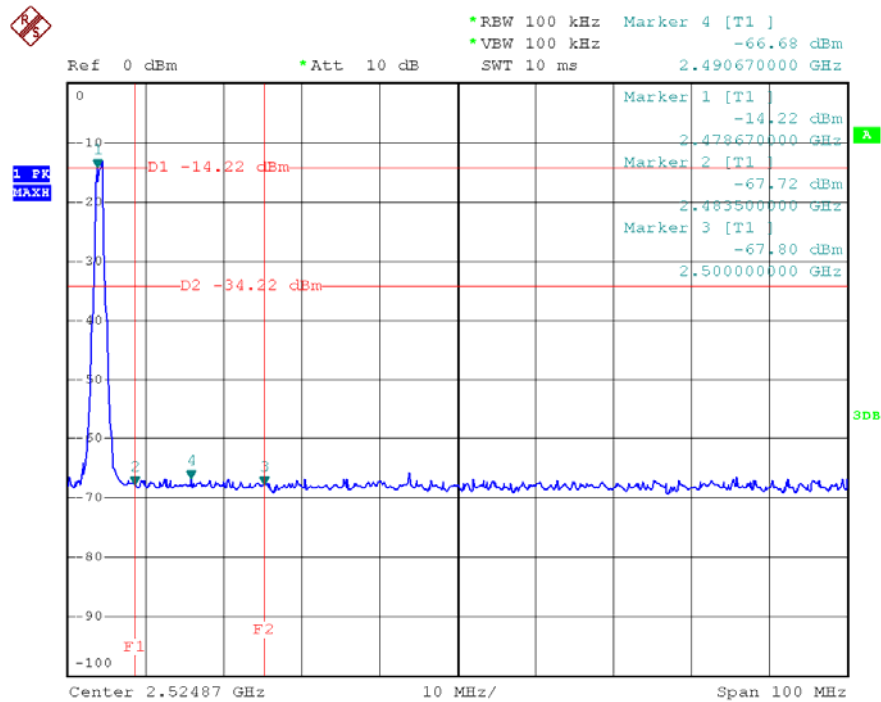


CH01 (Lower)



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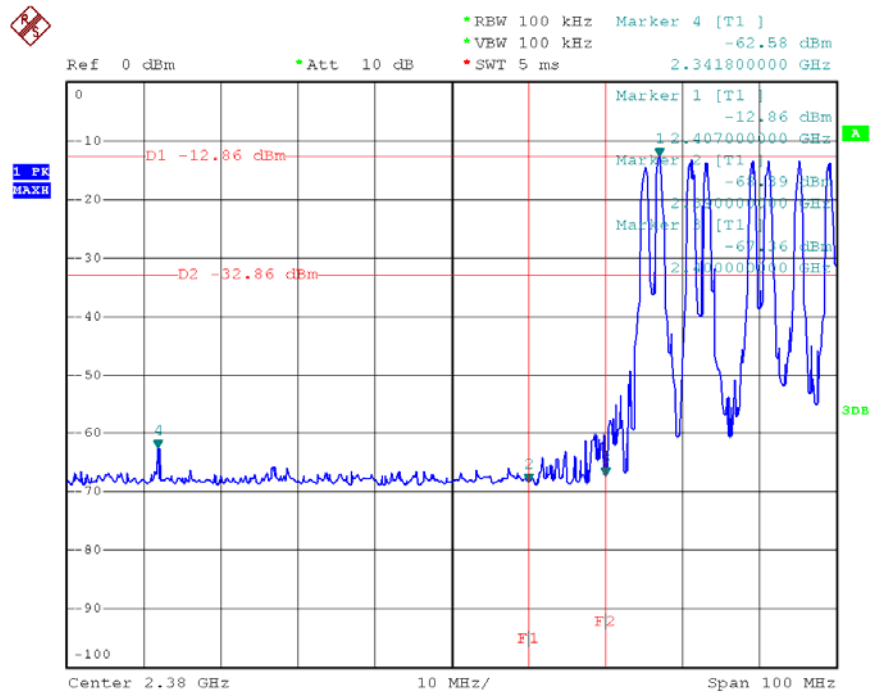
CH 39 (Upper)



Date: 10.FEB.2011 09:39:27

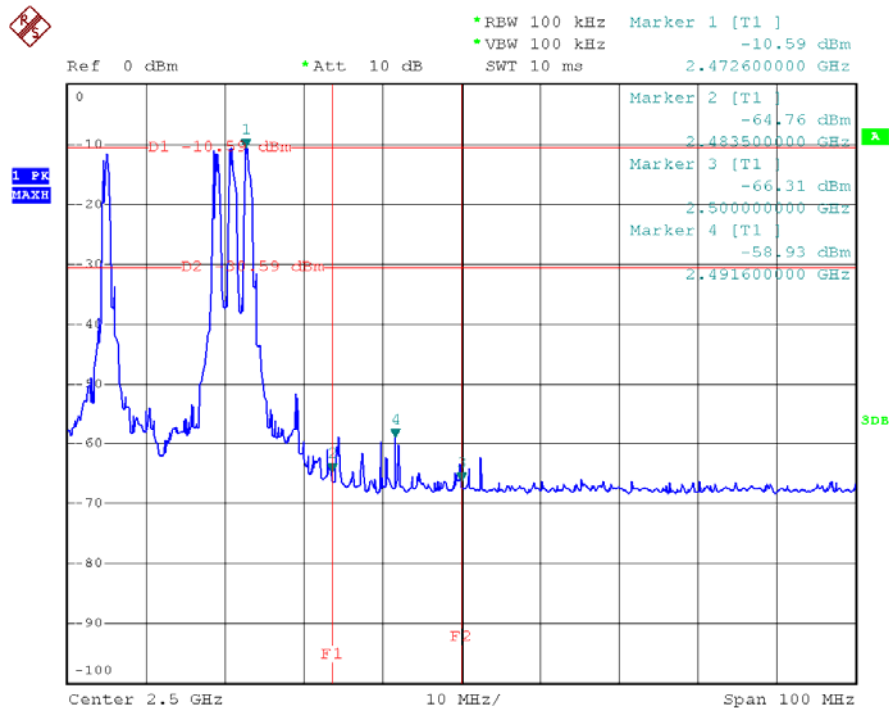


Hopping Mode (Lower)

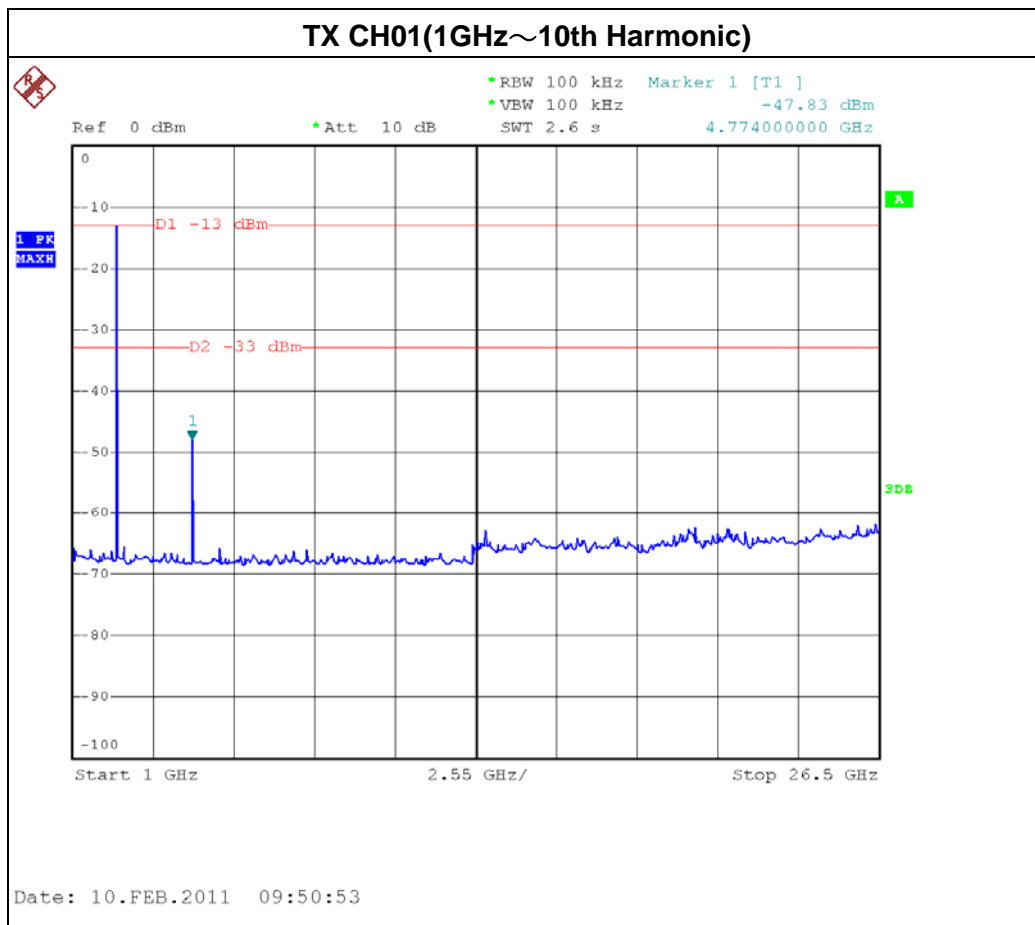
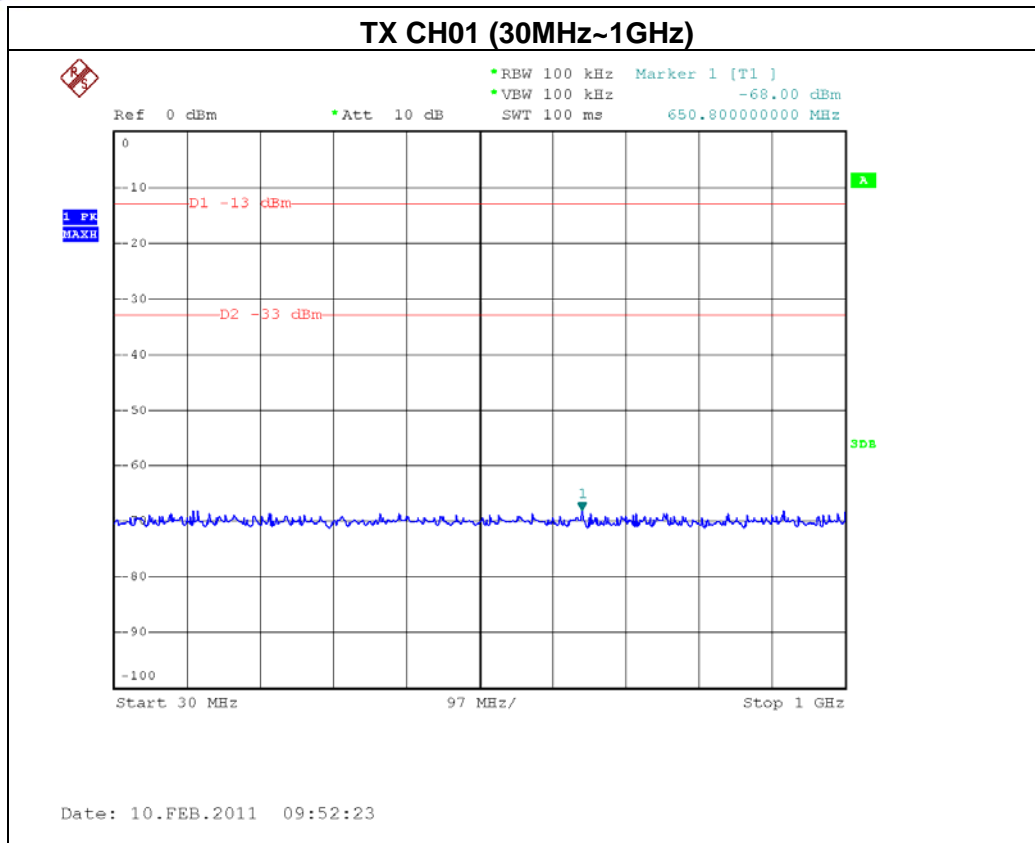


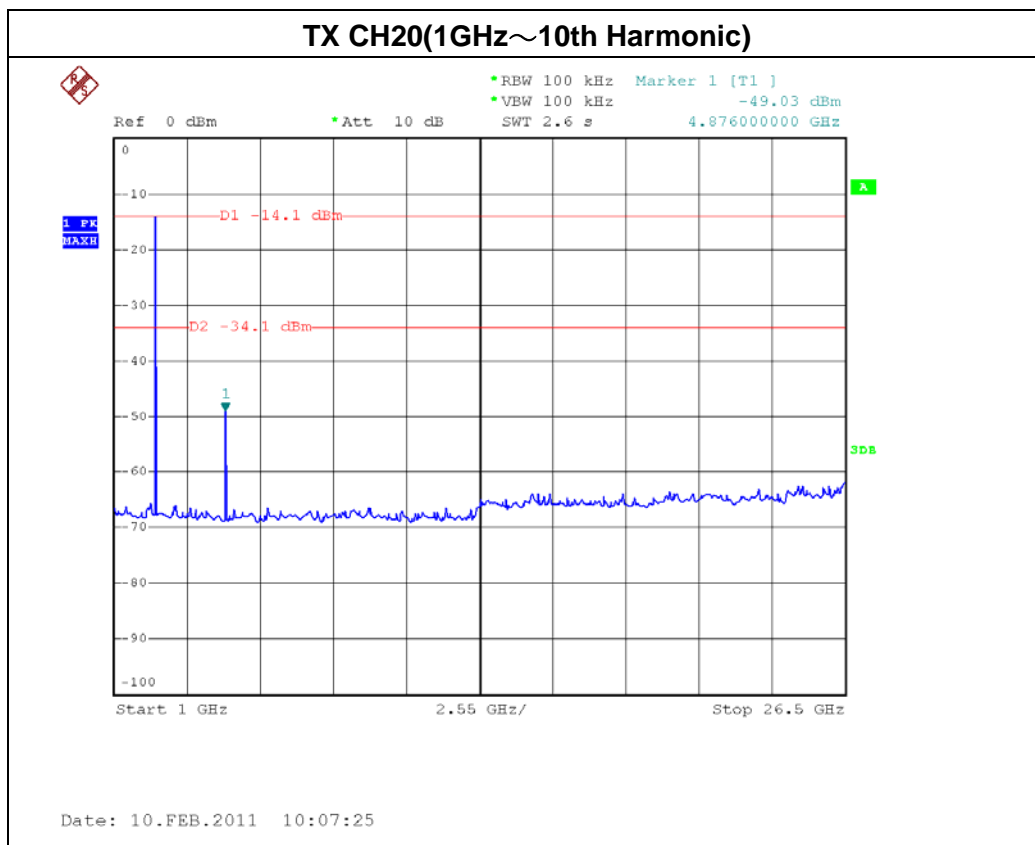
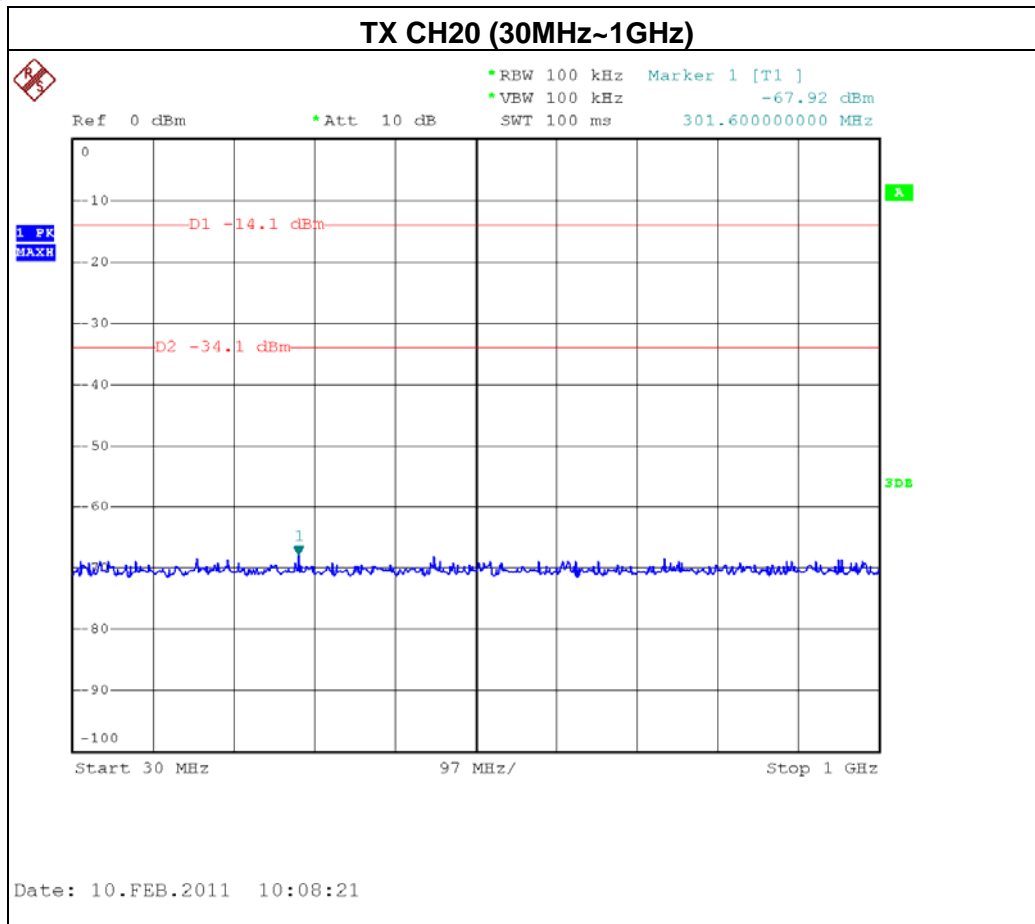
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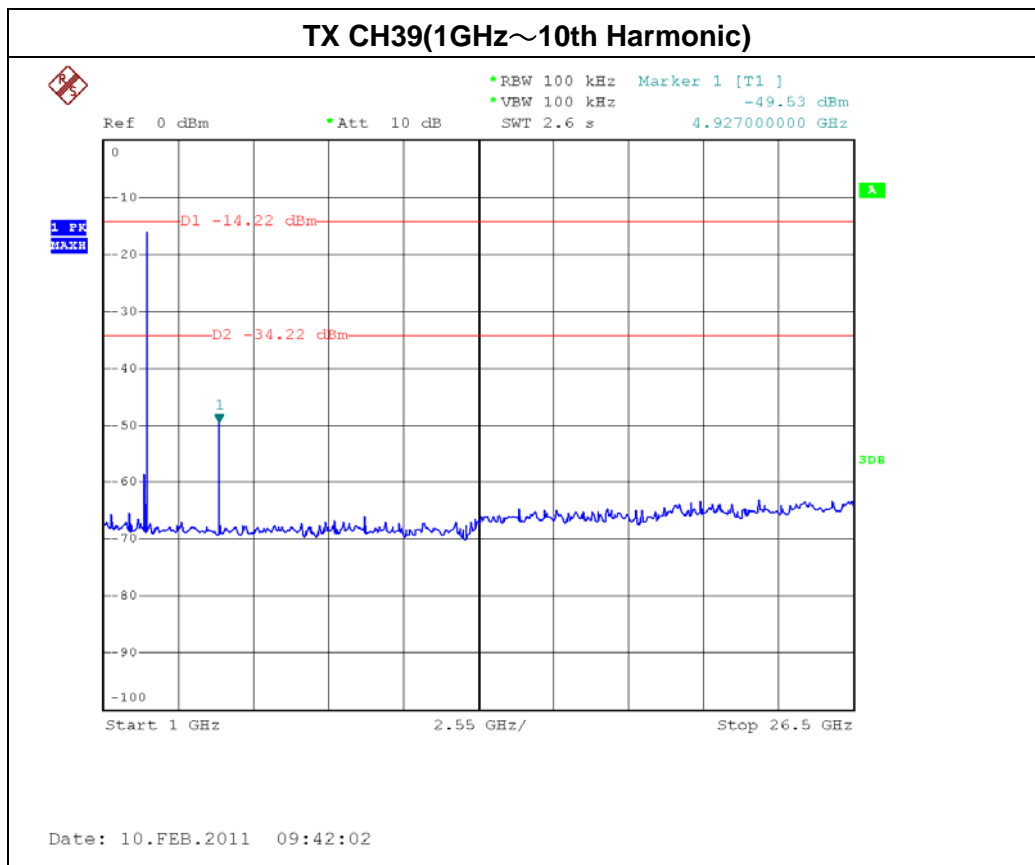
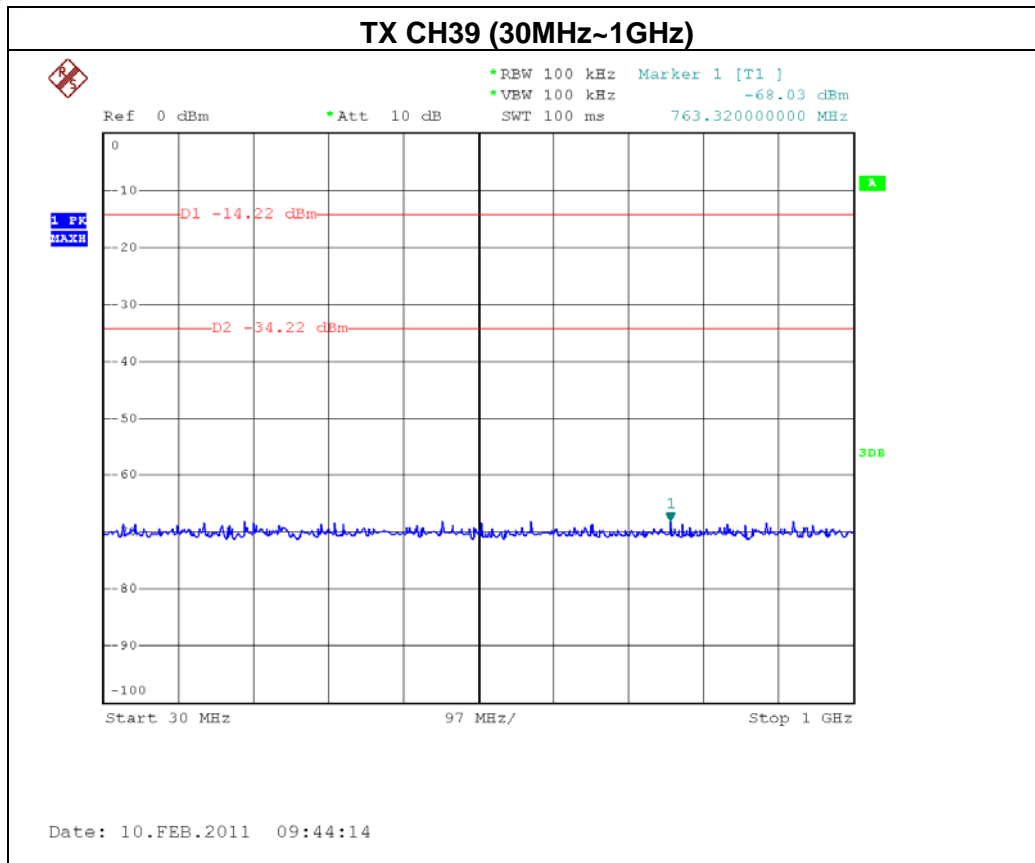
Hopping Mode (Upper)



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11. EUT TEST PHOTO

Radiated Measurement Photos

