FCC Radio TEST Report

FCC ID: TW4870VL

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

Issued Date : Mar. 20, 2008
Project No. : 0801C039
Equipment : 2.4G wireless transceiver
Model Name : 870VL
Applicant : SHENZHEN AEE WIRELESS TECHNOLOGY CO.,LTD
Address : 1/F.,Blog.B,Tsinghua Hi-Tech Park, Northern Hi-Tech Industrial Park, Nanshan District,Shenzhen,P.R.C

Tested by:
Neutron Engineering Inc. EMC Laboratory
Date of Test:
Jan. 09, 2008 ~ Mar. 20, 2008

Testing Engineer : Tendy Huang (Tendy Huang)
Technical Manager : Steven Lu (Steven Lu)
Authorized Signatory : Vic Chiu (Vic Chiu)

NEUTRON ENGINEERING INC.

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NVLAP Lab Code: 200145-0 ilac-MRA TAF Testing Laboratory 0659

Declaration

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

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Limitation

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

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1. CERTIFICATION

Equipment: 2.4G wireless transceiver
Trade Name : AEE
Model Name.: 870VL
Applicant: SHENZHEN AEE WIRELESS TECHNOLOGY CO.,LTD
Date of Test: Jan. 09, 2008 ~ Mar. 20, 2008
Test Item: ENGINEERING SAMPLE
Standards: FCC Part15, Subpart C(15.249)/ ANCI C63.4 : 2003

The above equipment has been tested and found compliance with the requirement of the relative standards by Neutron Engineering Inc. EMC Laboratory.
The test data, data evaluation, and equipment configuration contained in our test report (Ref No. NEI-FCCP-1-0801C039) 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	
15.249	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 **C01/OS02** at the location of No.132-1, Lane 329, Sec. 2, Palain Road, Shijr City, Taipei, Taiwan.
Neutron's test firm number is 95335

2.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**，where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95** %。

A. Conducted Measurement :

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

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U，(dB)	NOTE
OS-01	ANSI	30MHz ~ 200MHz	V	3.82	
		30MHz ~ 200MHz	H	3.60	
		200MHz ~ 1,000MHz	V	3.86	
		200MHz ~ 1,000MHz	H	3.94	
OS-02	ANSI	30MHz ~ 200MHz	V	2.48	
		30MHz ~ 200MHz	H	2.16	
		200MHz ~ 1,000MHz	V	2.50	
		200MHz ~ 1,000MHz	H	2.66	

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	2.4G wireless transceiver
Trade Name	AEE
Model Name.	870VL
OEM Brand/Model Name	N/A
Model Difference	N/A
Product Description	The EUT is a 2.4G wireless transceiver. Product Type: Low Power Communication Device Operation Frequency: 2414~2468 MHz Modulation Type: GFSK Number Of Channel: 4CH Antenna Designation: Dipole antenna Antenna Gain(Peak): 2.0 dBi Output Power: 82.54 dBuV/m (AV Max.) Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.
Channel List	Please refer to the Note 2.
Power Source	DC Voltage Supplied from AC/DC Adapter Brand name:IE Model name:ILD35-08-0300S
Power Rating	I/P AC 120V/60Hz O/P DC 8V 300mA
Connecting I/O Port(s)	Please refer to the User's Manual

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2.

Freqeuncy Band	Channel No.	Frequency
2400~2483.5MHz	1	2414 MHz
	2	2432 MHz
	3	2450 MHz
	4	2468 MHz

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	AEE	ANT-870VL	Dipole Antenna	R-SMA	2.00

3.2 DESCRIPTION OF TEST MODES

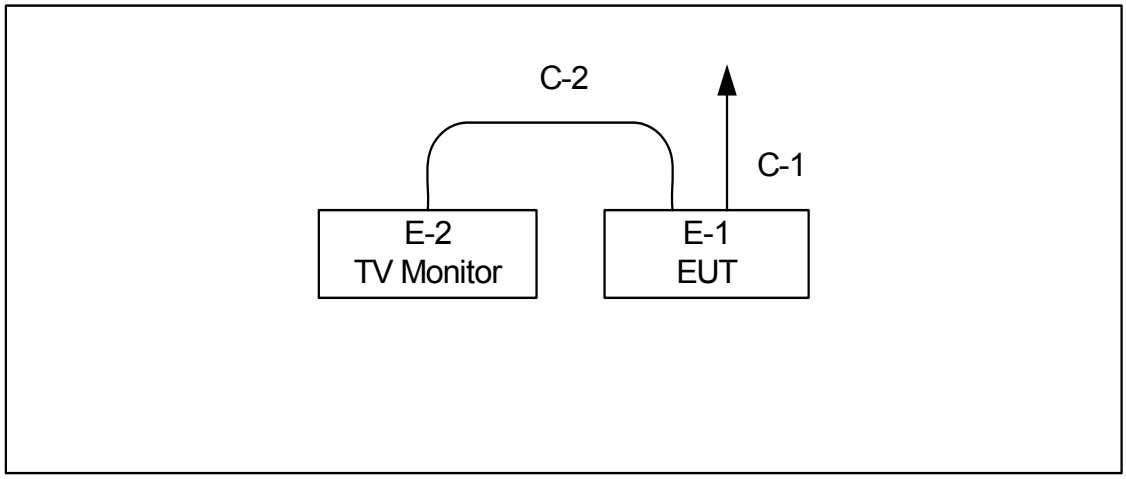
To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration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

Pretest Mode	Description
Mode 1	CH Lower - 2414MHz
Mode 2	CH Middle - 2432MHz
Mode 3	CH Highest -2468MHz

For Conducted Test	
Final Test Mode	Description
Mode 4	Normal Link with Camera & Receiver(Transceiver)

For Radiated Test	
Final Test Mode	Description
Mode 1	CH Lower - 2414MHz
Mode 2	CH Middle - 2432MHz
Mode 3	CH Highest -2468MHz

3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



C-1 DC Power Line
C-2 Audio/Video Cable

3.4 DESCRIPTION OF SUPPORT UNITS

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

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
E-1	2.4G wireless transceiver	AEE	870VL	TW4870VL	N/A	EUT
E-2	TV Monitor	TCL	1475S	DOC	N/A	

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

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

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	LISN	EMCO	3816/2	00042991	Jan. 24, 2009
2	LISN	EMCO	3816/2	00042990	Jan. 24, 2009
3	Pulse Limiter	Electro-Metrics	EM-7600	112644	Nov. 27, 2008
4	50Ω Terminator	N/A	N/A	N/A	May.13, 2008
5	Test Cable	N/A	C01	N/A	Nov. 27, 2008
6	EMI Test Receiver	R&S	ESCI	100082	Mar. 07, 2009

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

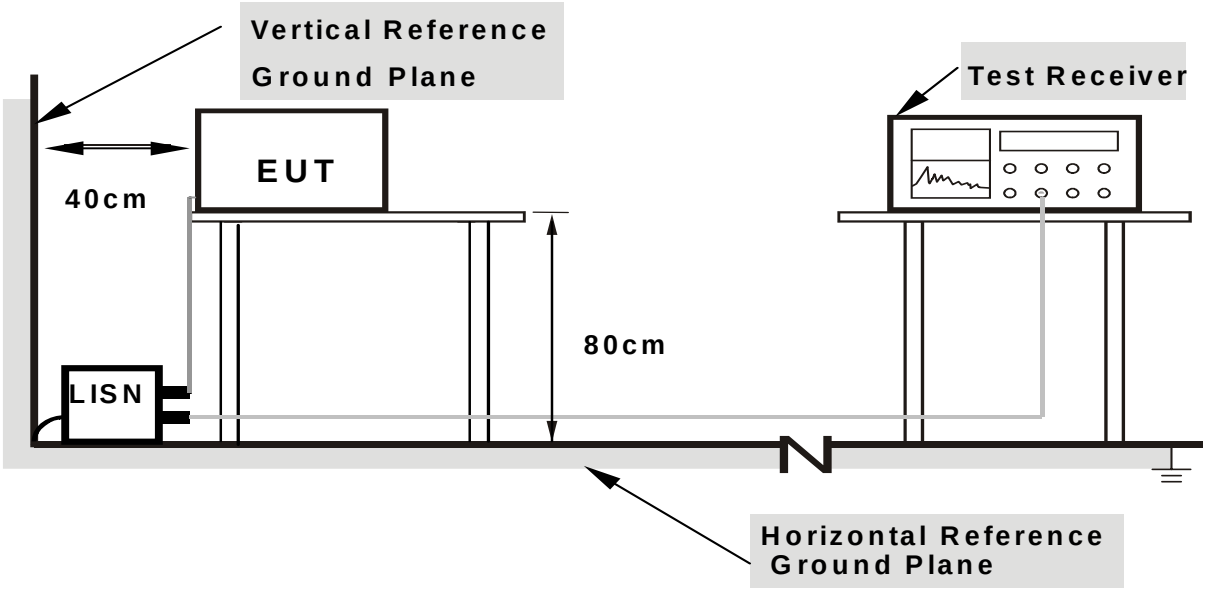
4.1.3 TEST PROCEDURE

a. The EUT was placed 0.4 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

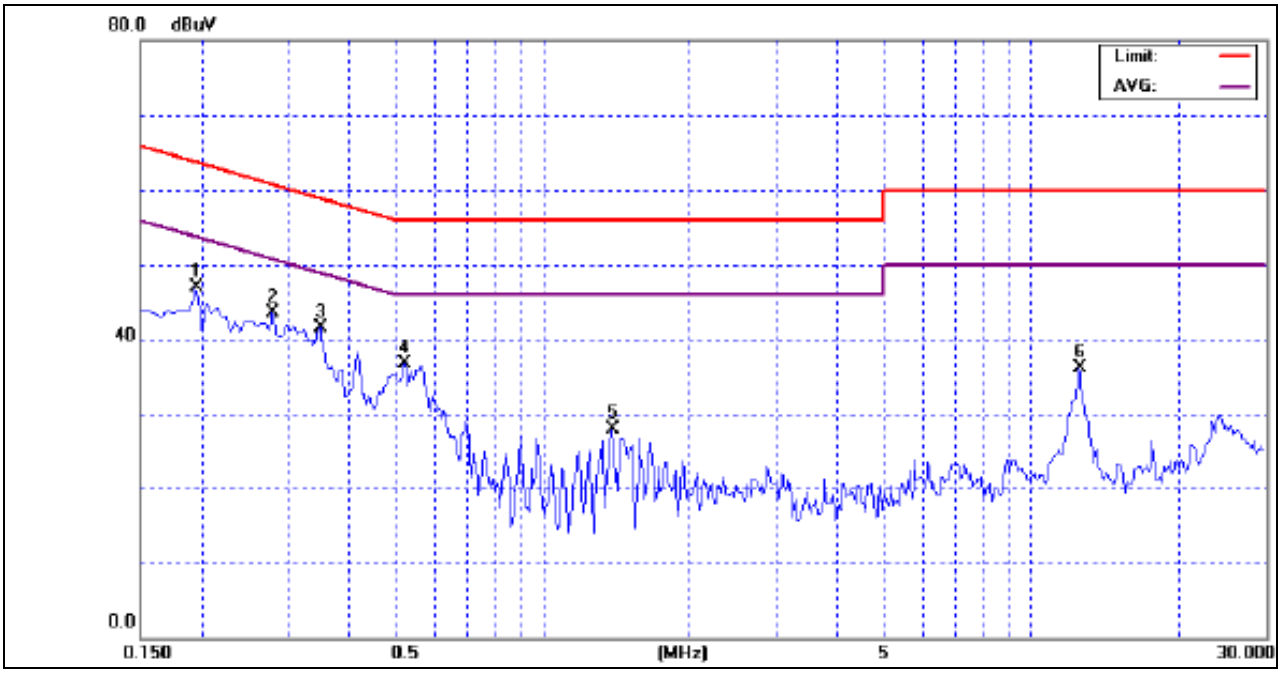
E.U.T :	2.4G wireless transceiver	Model Name :	870VL
Temperature :	22 ℃	Relative Humidity :	55 %
Pressure :	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	Normal Link with Camera & Receiver(Transceiver)		

Freq. (MHz)	Terminal L/N	Measured(dBuV)		Limits(dBuV)		Margin (dB)	Note
		QP-Mode	AV-Mode	QP-Mode	AV-Mode		
0.20	Line	46.99	*	63.82	53.82	-16.83	(QP)
0.28	Line	43.53	*	60.82	50.82	-17.29	(QP)
0.35	Line	41.58	*	58.96	48.96	-17.38	(QP)
0.52	Line	36.77	*	56.00	46.00	-19.23	(QP)
1.39	Line	28.00	*	56.00	46.00	-28.00	(QP)
12.55	Line	36.02	*	60.00	50.00	-23.98	(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。



E.U.T :	2.4G wireless transceiver	Model Name :	870VL
Temperature :	22 ℃	Relative Humidity :	55 %
Pressure :	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	Normal Link with Camera & Receiver(Transceiver)		

Freq. (MHz)	Terminal L/N	Measured(dBuV)		Limits(dBuV)		Margin (dB)	Note
		QP-Mode	AV-Mode	QP-Mode	AV-Mode		
0.18	Neutral	47.17	*	64.49	54.49	-17.32	(QP)
0.26	Neutral	45.66	*	61.59	51.59	-15.93	(QP)
0.52	Neutral	39.03	*	56.00	46.00	-16.97	(QP)
1.39	Neutral	25.18	*	56.00	46.00	-30.82	(QP)
12.55	Neutral	35.69	*	60.00	50.00	-24.31	(QP)
23.64	Neutral	31.39	*	60.00	50.00	-28.61	(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。

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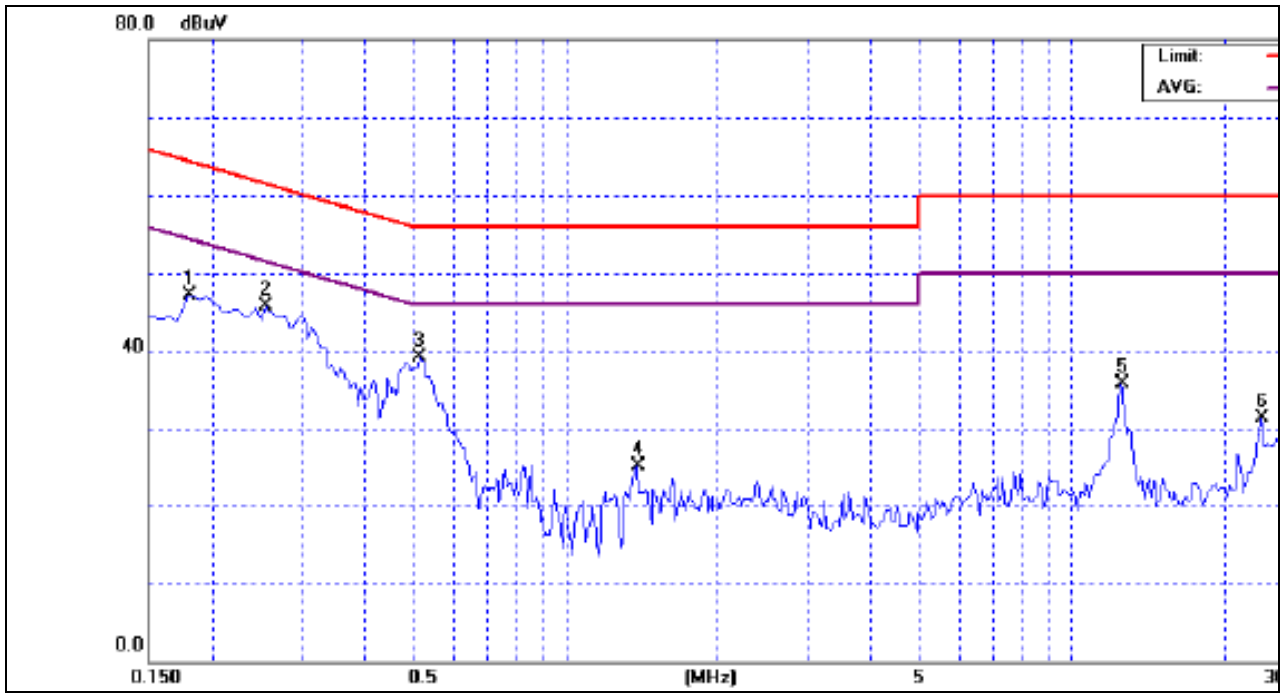


4.2 RADIATED EMISSION MEASUREMENT

4.2.1 RADIATED EMISSION LIMITS (FCC 15.209)

requencies (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)	Class A (dBuV/m) (at 3m)		Class B (dBuV/m) (at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
Above 1000	80	60	74	54

Notes:

(1) The limit for radiated test was performed according to FCC PART 15B.

(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	Log-Bicon Antenna	Schwarzbeck	VULB 9160	3058	Nov. 27, 2008
2	Test Cable	N/A	10M_OS02	N/A	Nov. 27, 2008
3	Test Cable	N/A	OS02-1/-2/-3	N/A	Nov. 27, 2008
4	Pre-Amplifier	Anritsu	MH648A	M09961	Nov. 27, 2008
5	EMI Test Receiver	R&S	ESCI	100082	Jan. 30, 2009
6	Antenna Mast	Chance Most	CMTB-1.5	N/A	N/A
7	Turn Table	Chance Most	CMTB-1.5	N/A	N/A
8	Spectrum Analyzer	R&S	FSP_40	100129	Jan. 07, 2009
9	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-325	Oct. 24, 2008
10	Horn Antenna	Schwarzbeck	BBHA9170	9170187	Oct. 24, 2008
11	Microwave Pre_amplifier	Agilent	8449B	3008A01714	Mar. 09, 2009
12	Microflex Cable	United Microwave	57793	1m	Mar. 09, 2009
13	Microflex Cable	United Microwave	A30A30-5006	10M	Jul. 07, 2008

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)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (other emission)	100KHz / 100KHz for peak

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

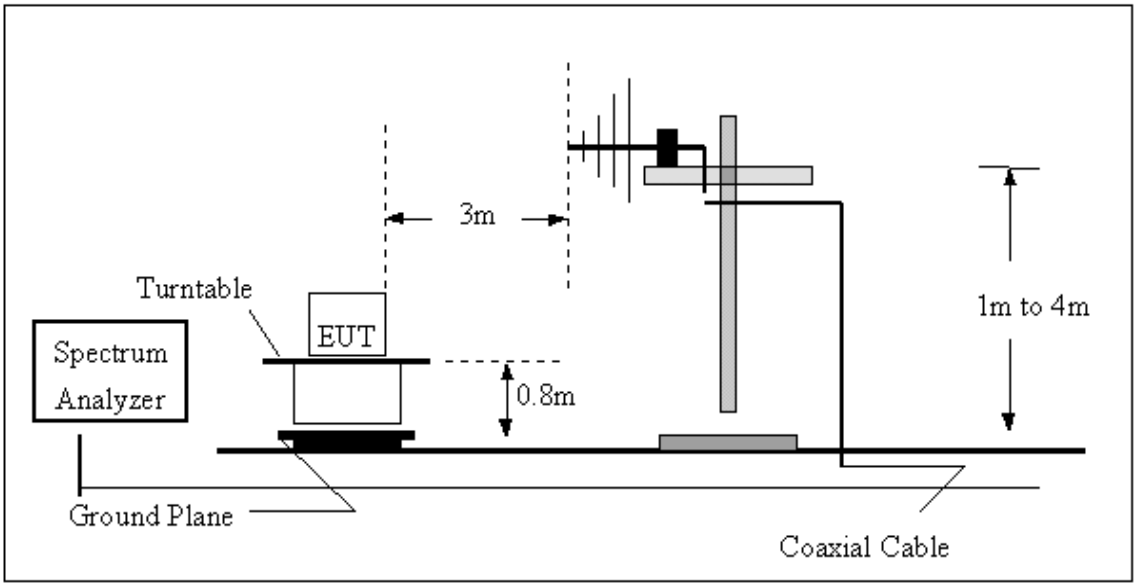
a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m meter open area test site. The table was rotated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

4.2.4 DEVIATION FROM TEST STANDARD

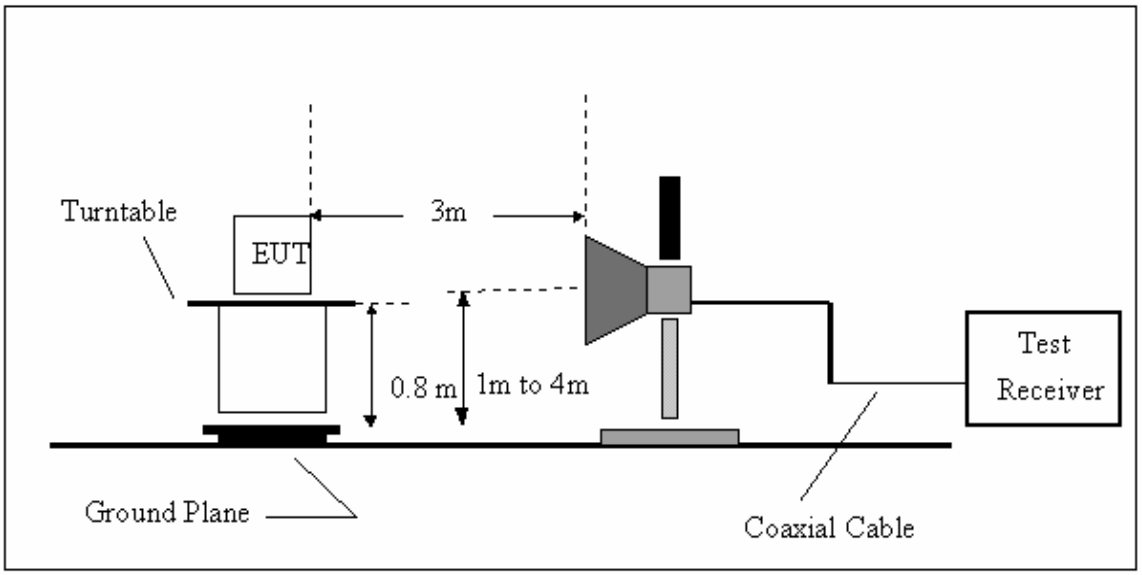
No deviation

4.2.5 TEST SETUP

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



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



4.2.6 EUT OPERATING CONDITIONS

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

4.2.7 TEST RESULTS (BETWEEN 30 – 1000 MHz)

EUT：	2.4G wireless transceiver	Model Name. ：	870VL
Temperature：	26 ℃	Relative Humidity：	60 %
Pressure：	1020hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX 2414MHz		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
57.16	V	45.37	-22.49	22.88	40.00	- 17.12	
134.76	V	39.58	-21.69	17.89	43.50	- 25.61	
241.46	V	41.26	-17.24	24.02	46.00	- 21.98	
437.40	V	42.30	-11.95	30.35	46.00	- 15.65	
485.90	V	46.76	-10.97	35.79	46.00	- 10.21	
534.40	V	35.52	-10.07	22.45	46.00	- 23.55	

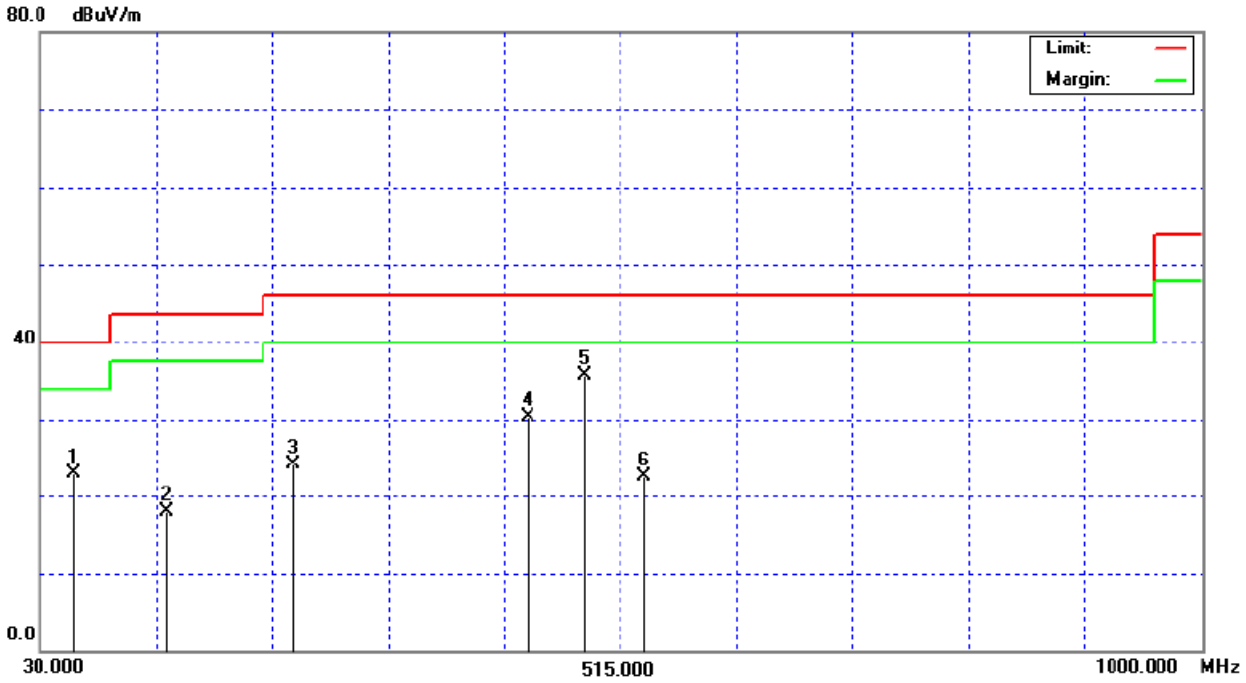
Remark：

(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：	2.4G wireless transceiver	Model Name. ：	870VL
Temperature：	26 ℃	Relative Humidity：	60 %
Pressure：	1020hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX 2414MHz		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
74.62	H	36.58	-22.64	13.94	40.00	- 26.06	
175.50	H	38.52	-19.80	18.72	43.50	- 24.78	
241.46	H	39.56	-17.24	22.32	46.00	- 23.68	
437.40	H	50.67	-11.95	38.72	46.00	- 7.28	
485.90	H	47.02	-10.97	36.05	46.00	- 9.95	
534.40	H	37.11	-10.07	27.04	46.00	- 18.96	

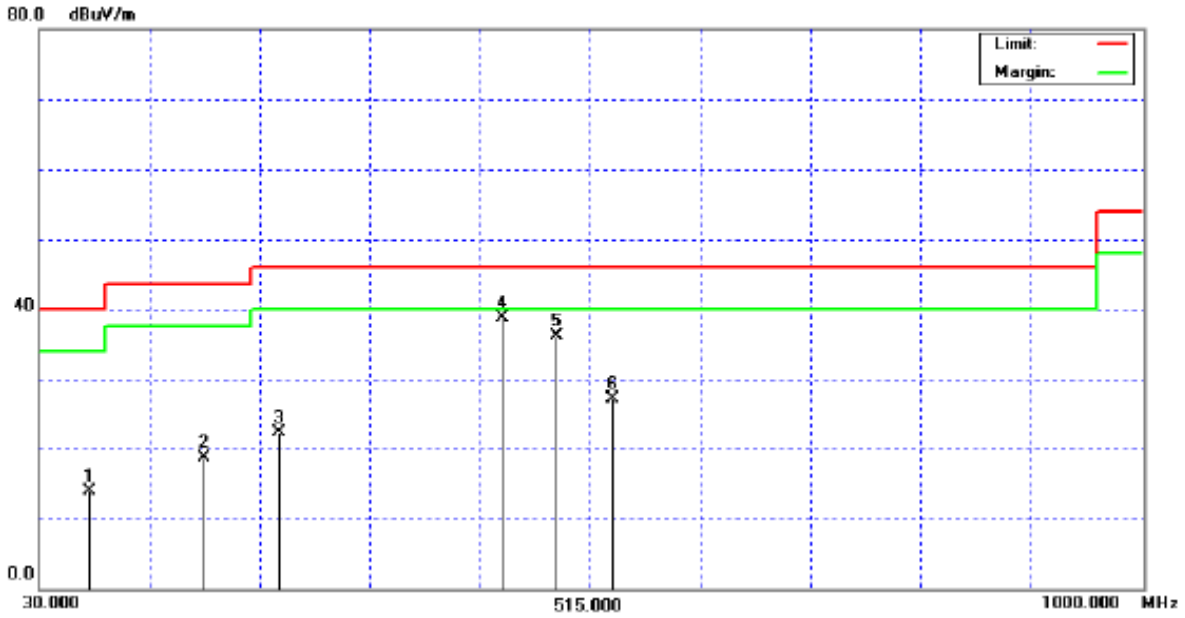
Remark：

(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.



4.2.8 TEST RESULTS (ABOVE 1000 MHz)

EUT：	2.4G wireless transceiver	Model Name. ：	870VL
Temperature：	20 ℃	Relative Humidity：	60 %
Pressure：	1010 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX 2414MHz		

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	20.93	9.46	32.05	52.98	41.51	74.00	54.00	X/E
2411.90	**V**	**49.51**	**41.46**	**32.12**	**81.63**	**73.58**	**114.00**	**94.00**	**X/F**
1933.98	V	51.29	50.53	-4.59	46.70	45.94	74.00	54.00	X/H
4823.48	V	42.26	35.36	3.57	45.83	38.93	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 。

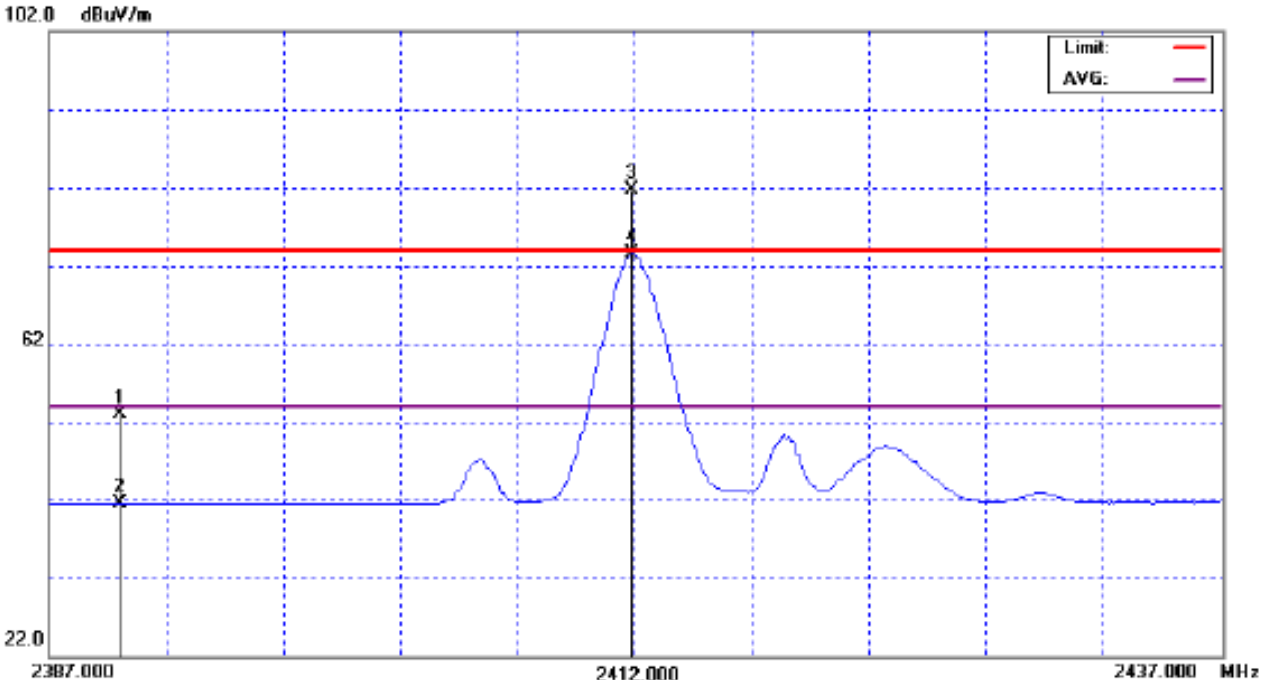
(4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

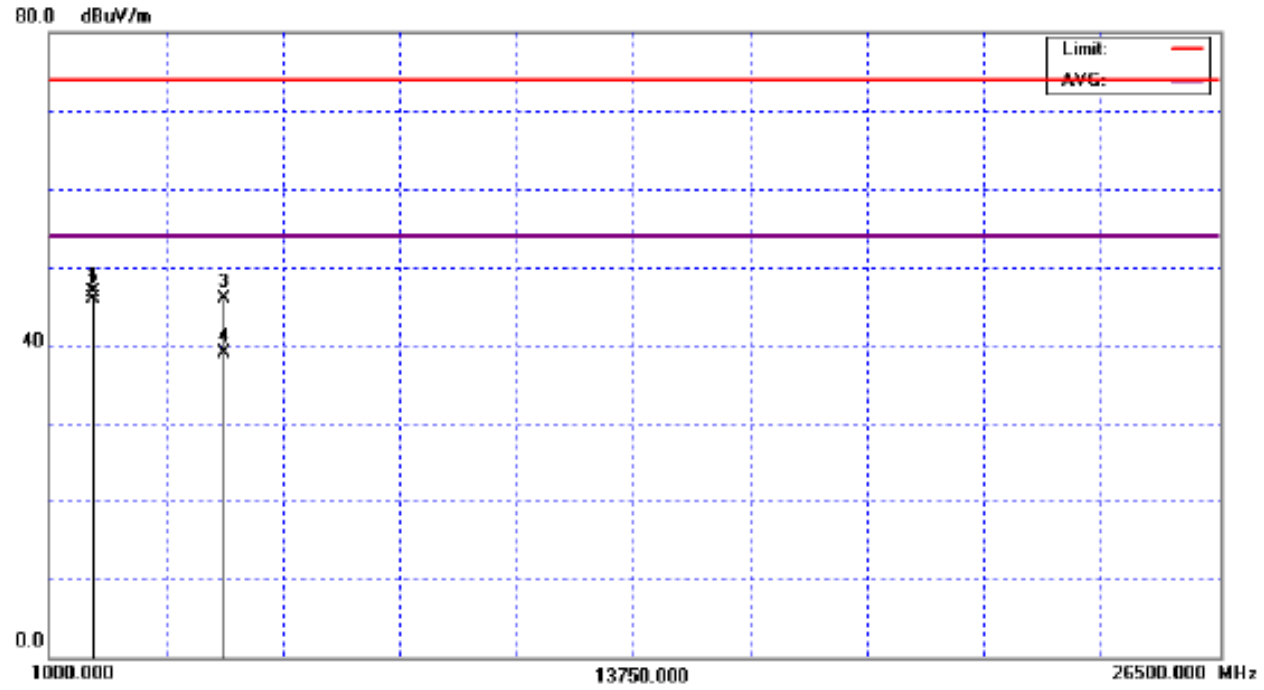
(5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

(6) EUT Orthogonal Axes：

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

Orthogonal Axes：X
TX 2414MHz (Above 1000 MHz, Vertical)





EUT：	2.4G wireless transceiver	Model Name. ：	870VL
Temperature：	20 ℃	Relative Humidity：	60 %
Pressure：	1010 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX 2414MHz		

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	21.19	9.47	32.05	53.24	41.52	74.00	54.00	X/E
2412.00	**H**	**49.87**	**41.37**	**32.12**	**81.99**	**73.49**	**114.00**	**94.00**	**X/F**
1933.98	H	50.87	49.06	-4.59	46.28	44.47	74.00	54.00	X/H
4823.48	H	38.26	31.39	3.57	41.83	34.96	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 。

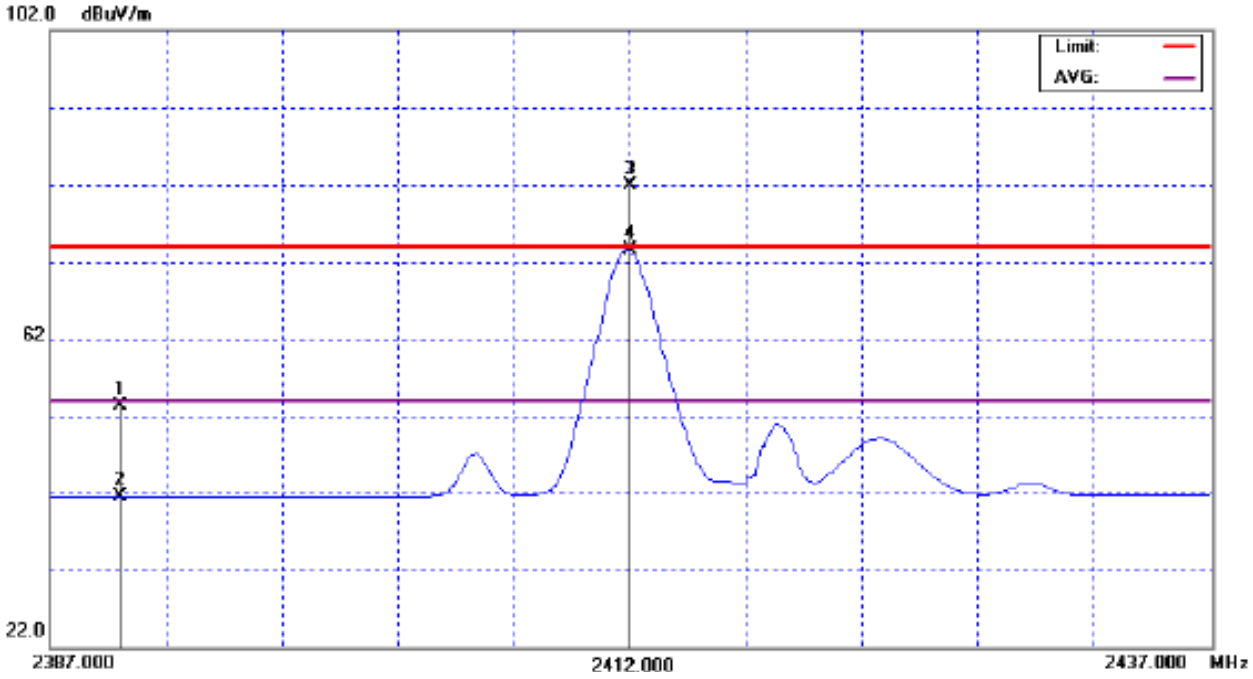
(4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

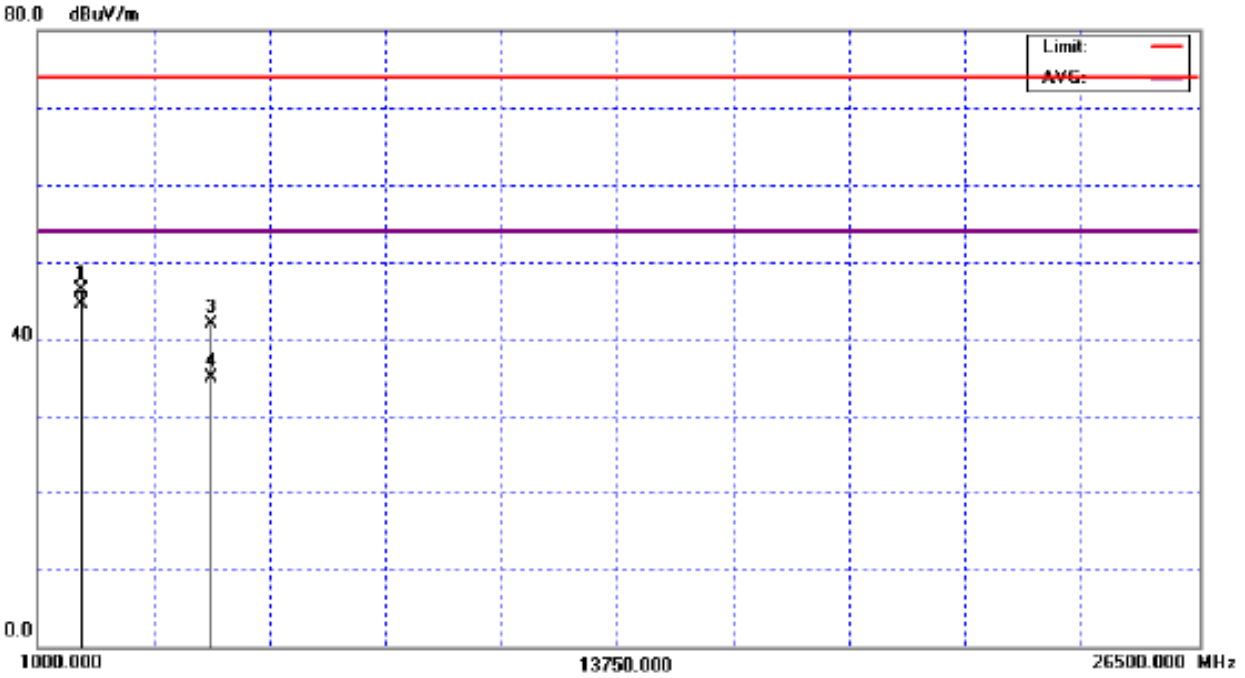
(5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

(6) EUT Orthogonal Axes：

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

Orthogonal Axes：X
TX 2414MHz (Above 1000 MHz, Horizontal)





EUT：	2.4G wireless transceiver	Model Name. ：	870VL
Temperature：	20 ℃	Relative Humidity：	60 %
Pressure：	1010 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX 2432MHz		

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)	
2432.00	**V**	**47.62**	**47.17**	**32.18**	**79.80**	**79.35**	**114.00**	**94.00**	**X/F**
1933.98	V	51.85	49.26	-4.59	47.26	44.67	74.00	54.00	X/E
4864.00	V	44.06	37.19	3.69	47.75	40.88	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 。

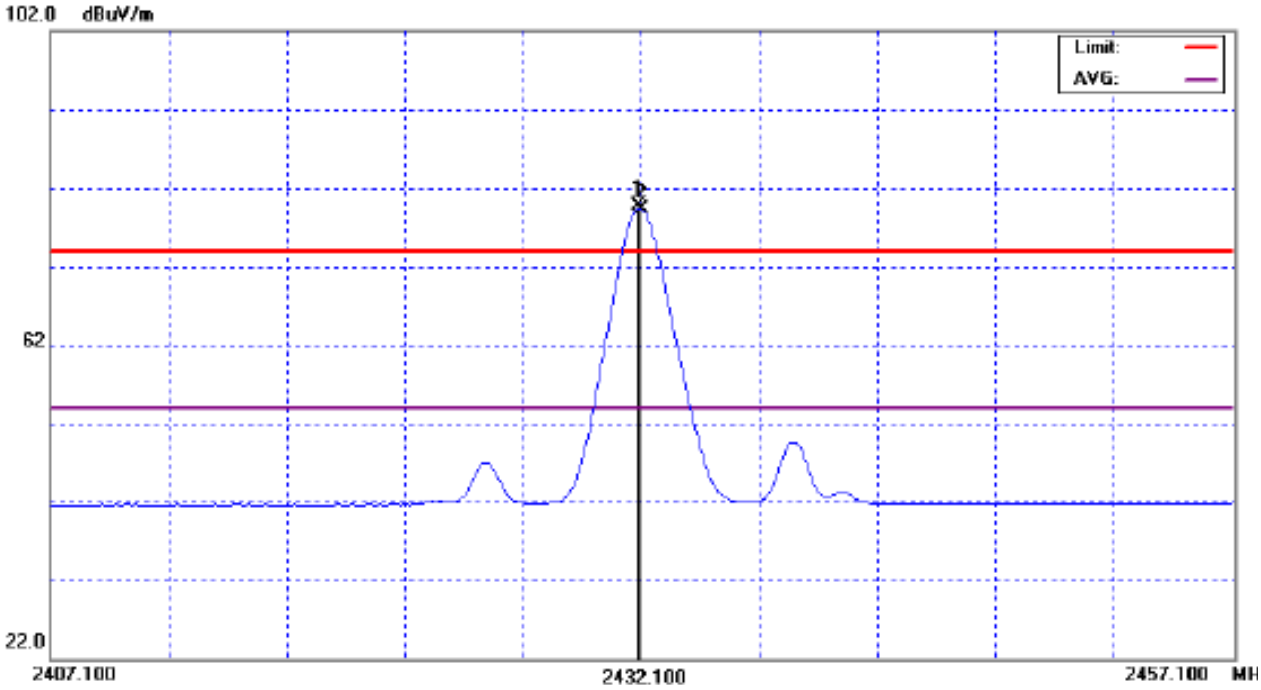
(4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

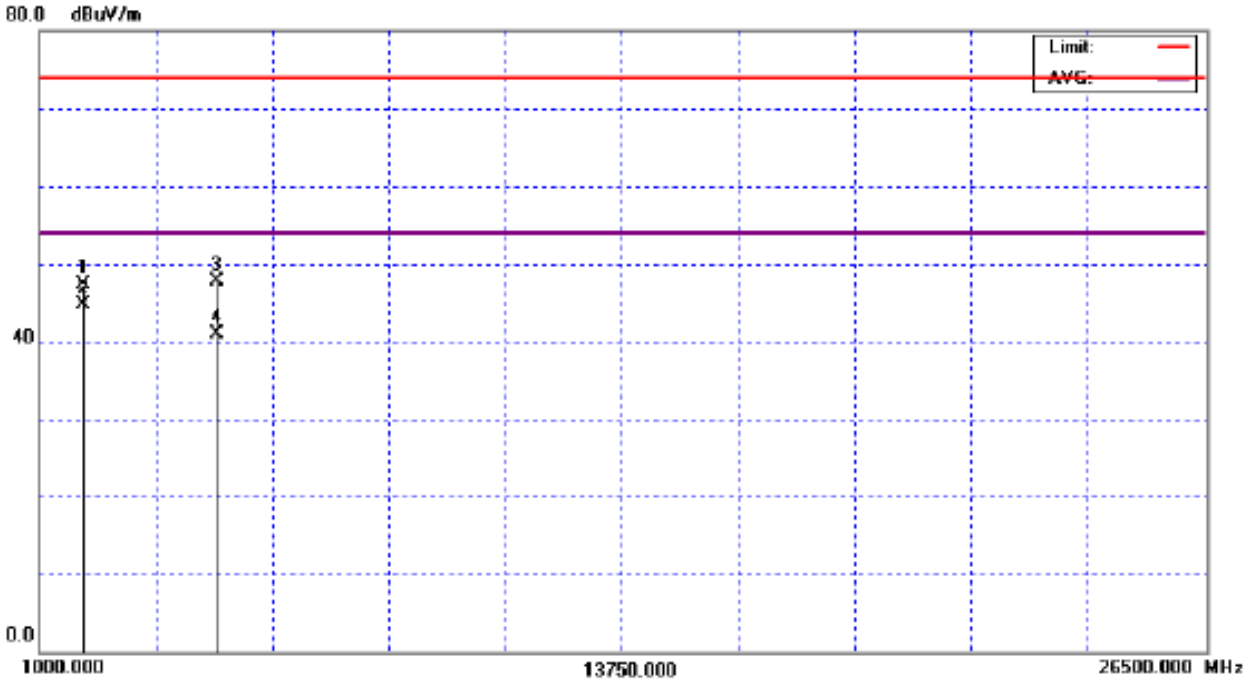
(5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

(6) EUT Orthogonal Axes：

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

Orthogonal Axes：X
TX 2432 MHz (Above 1000 MHz, Vertical)





EUT：	2.4G wireless transceiver	Model Name. ：	870VL
Temperature：	20 ℃	Relative Humidity：	60 %
Pressure：	1010 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX 2432MHz		

Freq.	Ant.Pol.	Reading		Ant./CF	Act.		Limit		Note
(MHz)	H/V	Peak (dBuV)	AV (dBuV)	CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
2432.00	**H**	**50.75**	**50.36**	**32.18**	**82.93**	**82.54**	**114.00**	**94.00**	**X/F**
1933.99	H	52.09	49.67	-4.59	47.50	45.08	74.00	54.00	X/E
4864.01	H	41.02	33.21	3.69	44.71	36.90	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 。

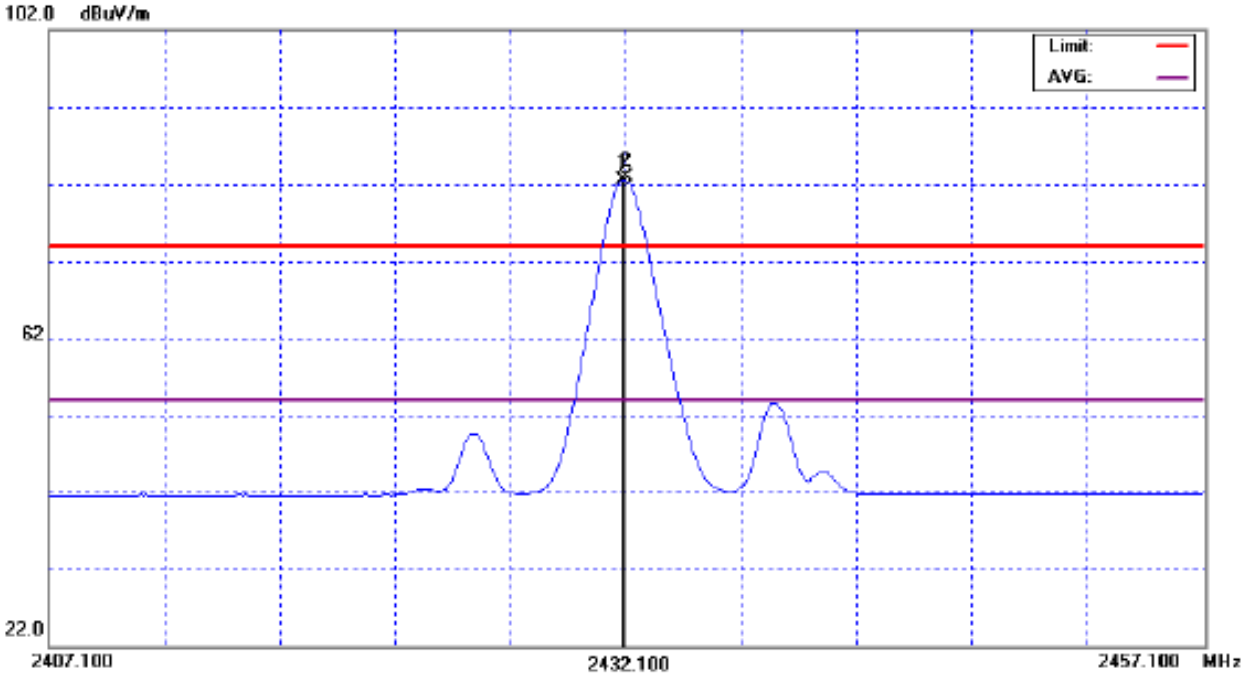
(4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

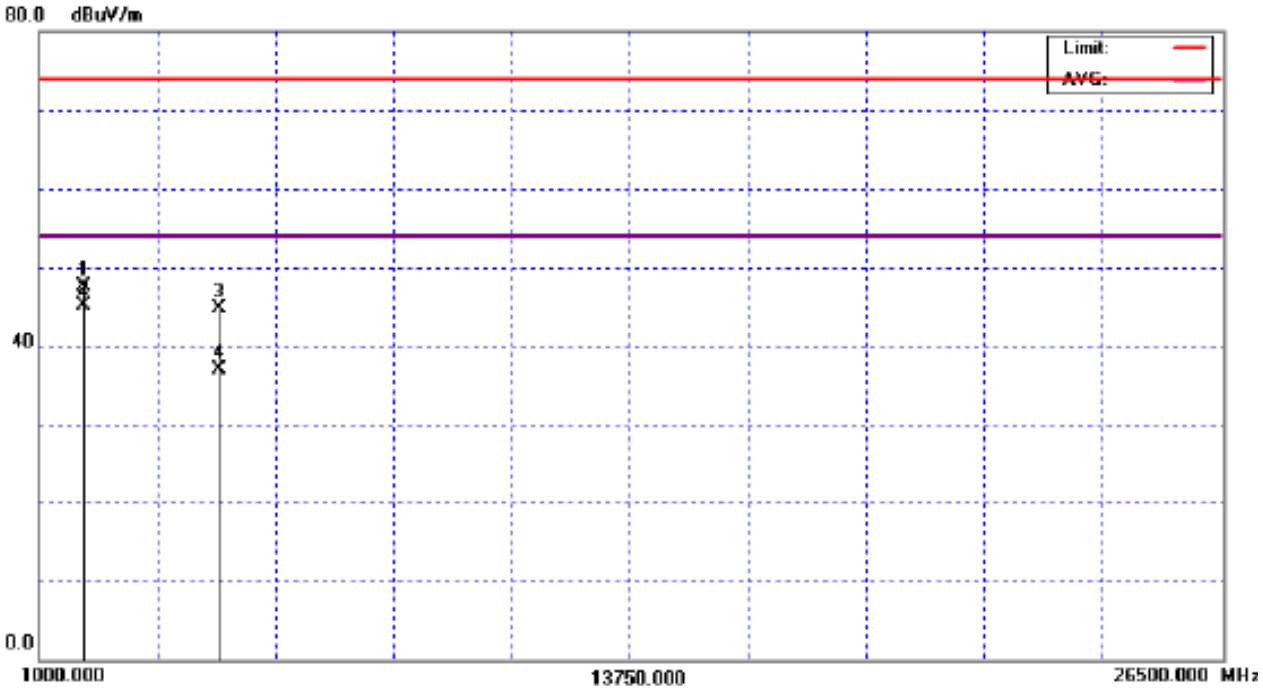
(5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

(6) EUT Orthogonal Axes：

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

Orthogonal Axes：X
TX 2432MHz (Above 1000 MHz, Horizontal)





EUT：	2.4G wireless transceiver	Model Name. ：	870VL
Temperature：	20 ℃	Relative Humidity：	60 %
Pressure：	1010 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX 2468MHz		

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)	
2468.24	**V**	**47.77**	**37.92**	**32.30**	**80.07**	**70.22**	**114.00**	**94.00**	**X/F**
2483.50	V	23.98	9.70	32.35	56.33	42.05	74.00	54.00	X/E
1933.98	V	52.36	50.87	-4.59	47.77	46.28	74.00	54.00	X/H
4936.26	V	42.36	36.01	3.91	46.27	39.92	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 。

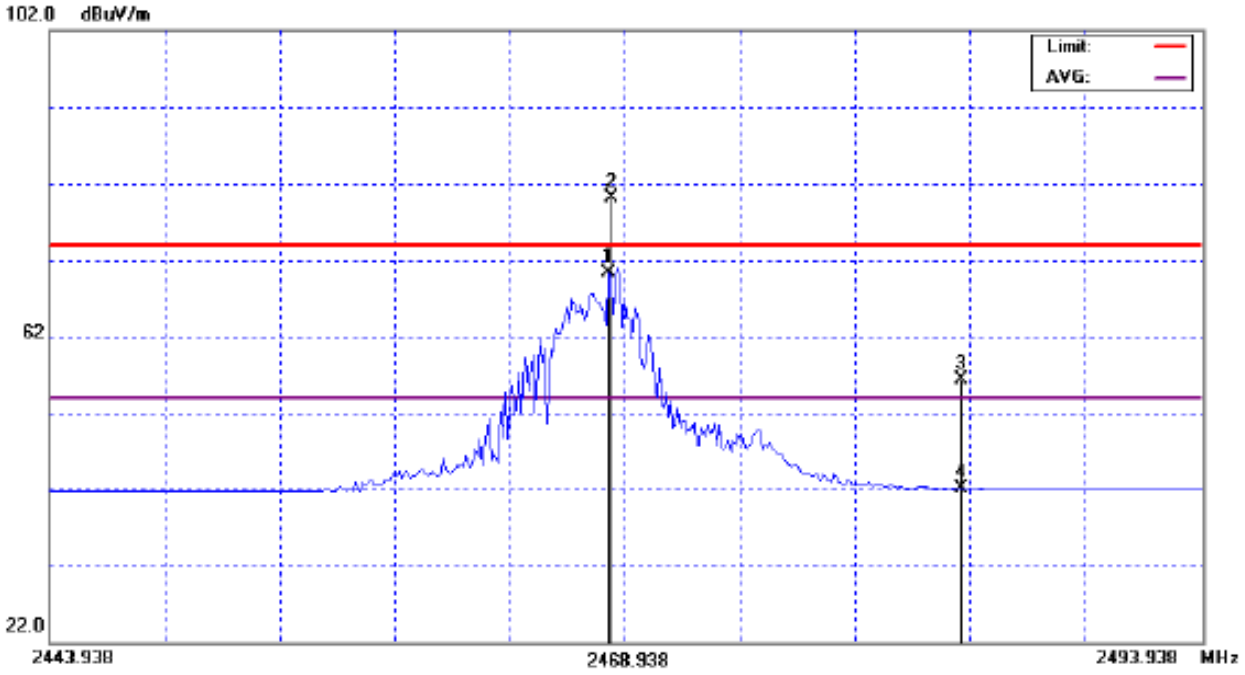
(4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

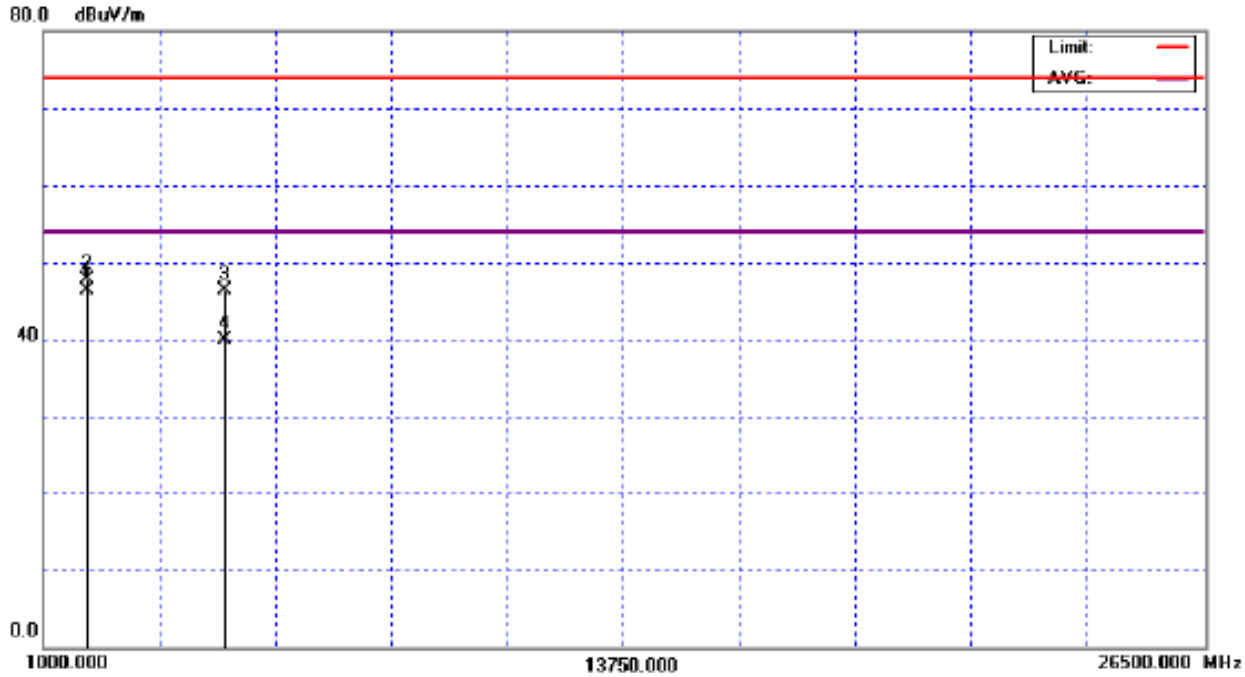
(5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

(6) EUT Orthogonal Axes：

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

Orthogonal Axes：X
TX 2468MHz (Above 1000 MHz, Vertical)





EUT：	2.4G wireless transceiver	Model Name. ：	870VL
Temperature：	20 ℃	Relative Humidity：	60 %
Pressure：	1010 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX 2468MHz		

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)	
2468.14	**H**	**49.91**	**46.89**	**32.30**	**82.21**	**79.19**	**114.00**	**94.00**	**X/F**
2483.50	H	21.00	9.51	32.35	53.35	41.86	74.00	54.00	X/E
1934.02	H	52.03	48.91	-4.59	47.44	44.32	74.00	54.00	X/H
4936.26	H	39.48	32.26	3.91	43.39	36.71	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 。

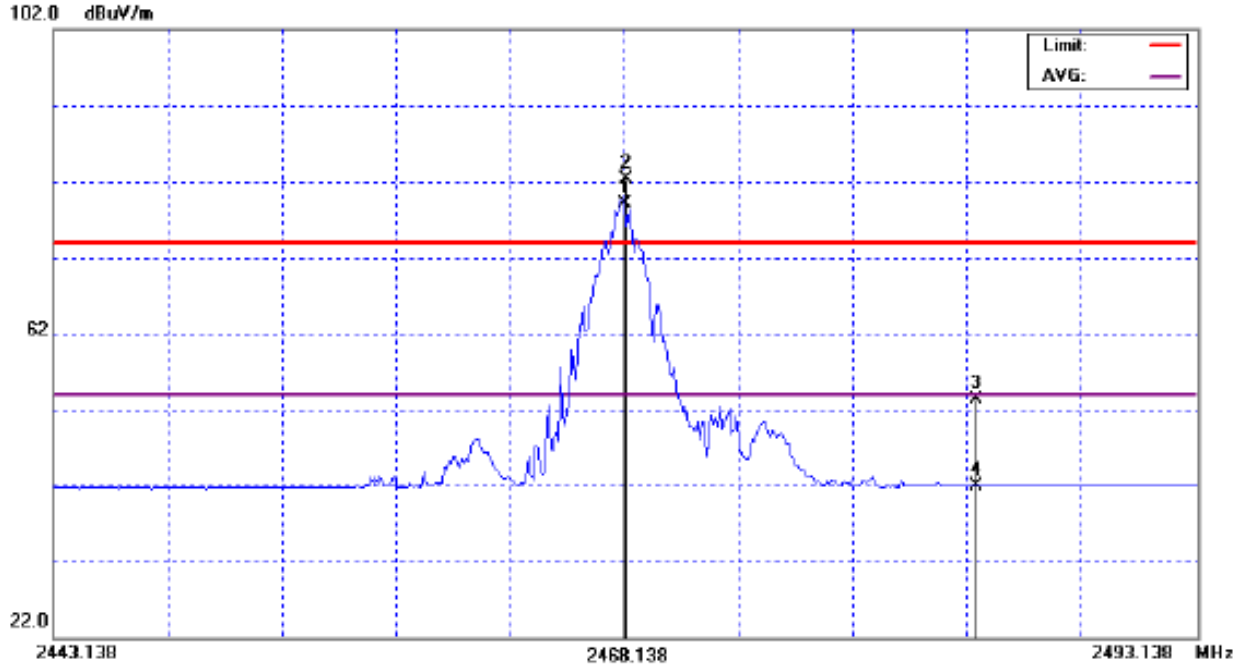
(4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

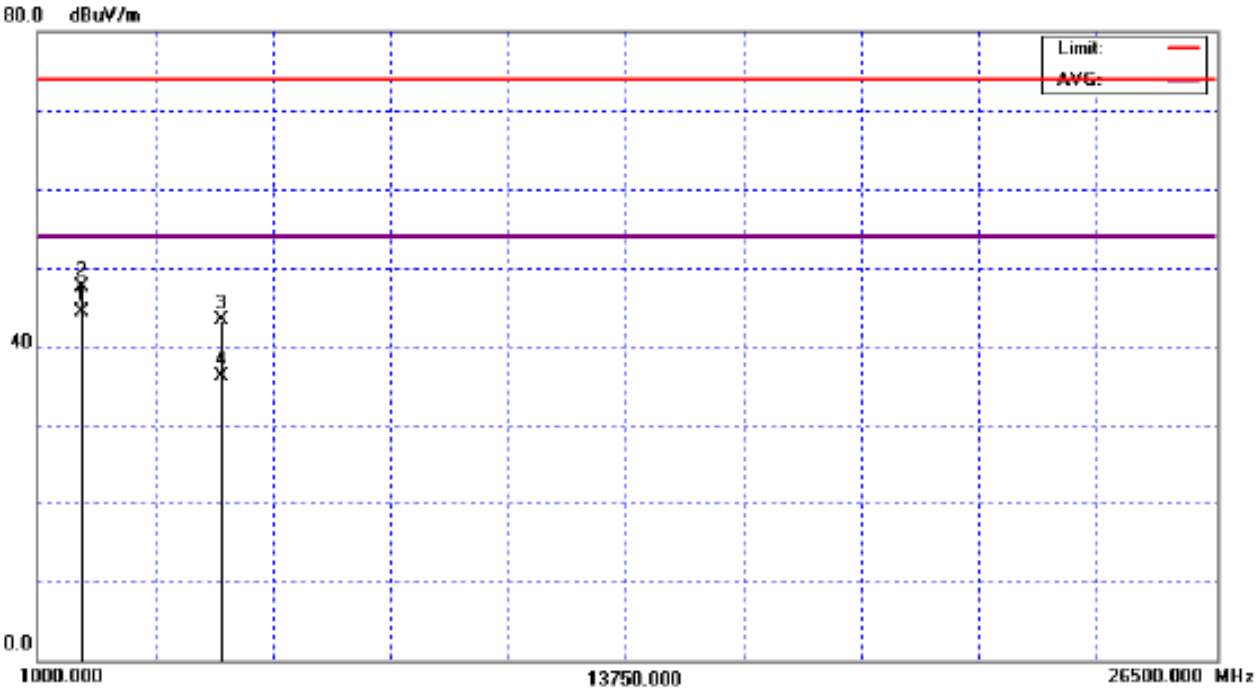
(5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

(6) EUT Orthogonal Axes：

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

Orthogonal Axes：X
TX 2468MHz (Above 1000 MHz, Horizontal)





4.2.9 TEST RESULTS (2414 – 2468 MHz)

EUT：	2.4G wireless transceiver	Model Name. ：	870VL
Temperature：	20 ℃	Relative Humidity：	60 %
Pressure：	1010 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX CH 2414MHz/2432MHz/2468MHz		

		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
2411.90	V	49.51	41.46	32.12	81.63	73.58	114.00	94.00	CH01
2412.00	H	49.87	41.37	32.12	81.99	73.49	114.00	94.00	CH01
2432.00	V	47.62	47.17	32.18	79.80	79.35	114.00	94.00	CH02
2432.00	H	50.75	50.36	32.18	82.93	82.54	114.00	94.00	CH02
2468.24	V	47.77	37.92	32.30	80.07	70.22	114.00	94.00	CH04
2468.14	H	49.91	46.89	32.30	82.21	79.19	114.00	94.00	CH04

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 Axes：

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

4.2.10 TEST RESULTS (Restricted Bands Requirements)

EUT：	2.4G wireless transceiver	Model Name. ：	870VL
Temperature：	20 ℃	Relative Humidity：	60 %
Pressure：	1010 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX CH 2414MHz/2468MHz(Vertical)		
Note：	The emission of the carrier radiated field strength is measured for (Peak and AV) as following: 1. The transmitter was then configured with the worst case antenna and setup to transmit at the lowest channel (CH01). Then the field strength was measured at 2310-2390 MHz. 2. The transmitter was configured with the worst case antenna and setup to transmit at the highest channel (CH04). Then the field strength was measured at 2483.5-2500 MHz.		

Freq.	Ant.Pol.	Reading		Ant./CF	Act.		Limit		Note
		Peak	AV		Peak	AV	Peak	AV	
(MHz)	H/V	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	
2390.00	V	20.93	9.46	32.05	52.98	41.51	74.00	54.00	CH01
2483.50	V	23.98	9.70	32.35	56.33	42.05	74.00	54.00	CH04

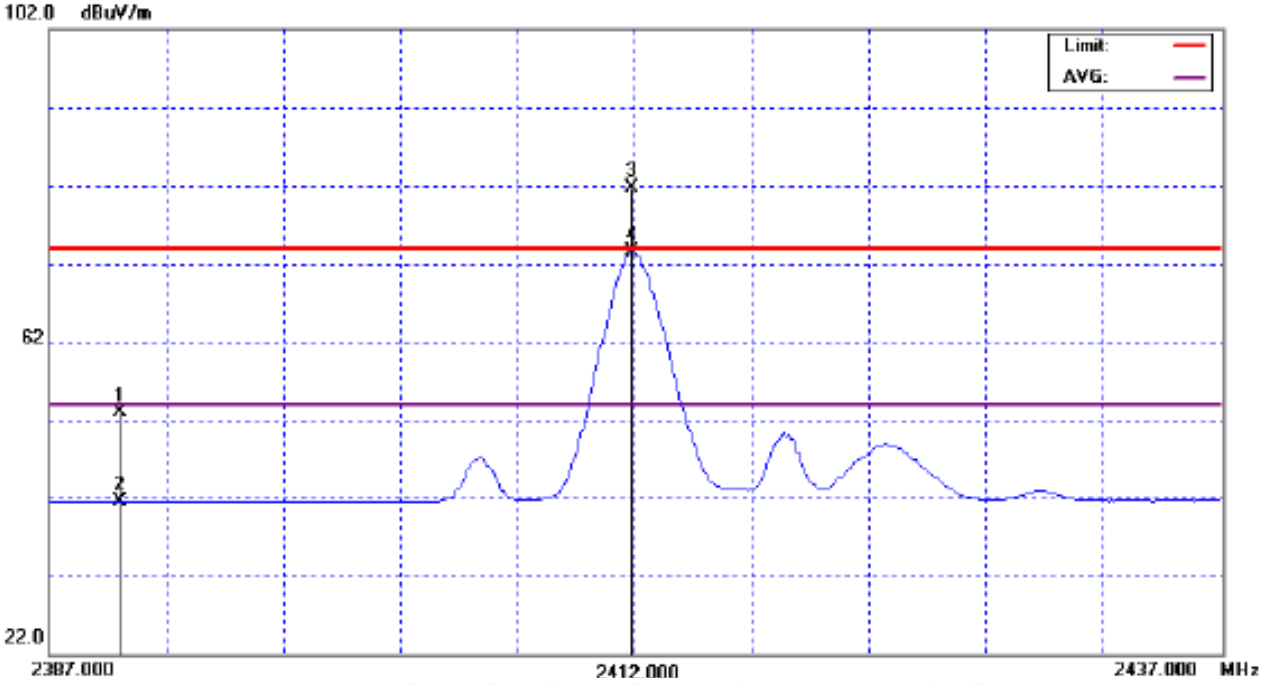
Remark：

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

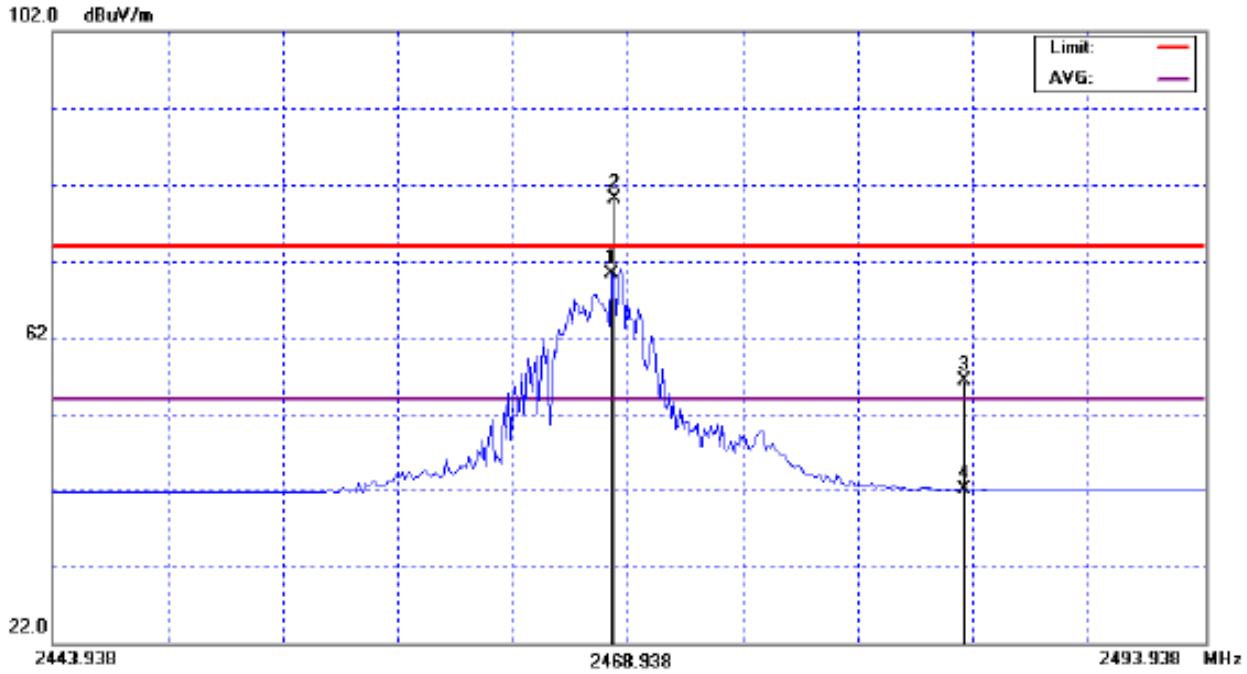
(2) EUT Orthogonal Axes：

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

TX CH 01 (Restricted Bands Requirements, Vertical)



TX CH 04 (Restricted Bands Requirements, Vertical)



EUT：	2.4G wireless transceiver	Model Name. ：	870VL
Temperature：	20 ℃	Relative Humidity：	60 %
Pressure：	1010 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX CH 2414MHz/2468MHz (Horizontal)		
Note：	The emission of the carrier radiated field strength is measured for (Peak and AV) as following: 1. The transmitter was then configured with the worst case antenna and setup to transmit at the lowest channel (CH01). Then the field strength was measured at 2310-2390 MHz. 2. The transmitter was configured with the worst case antenna and setup to transmit at the highest channel (CH04). Then the field strength was measured at 2483.5-2500 MHz.		

Freq.	Ant.Pol.	Reading		Ant./CF	Act.		Limit		Note
		Peak	AV		Peak	AV	Peak	AV	
(MHz)	H/V	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	
2390.00	H	21.19	9.47	32.05	53.24	41.52	74.00	54.00	CH01
2483.50	H	21.00	9.51	32.35	53.35	41.86	74.00	54.00	CH04

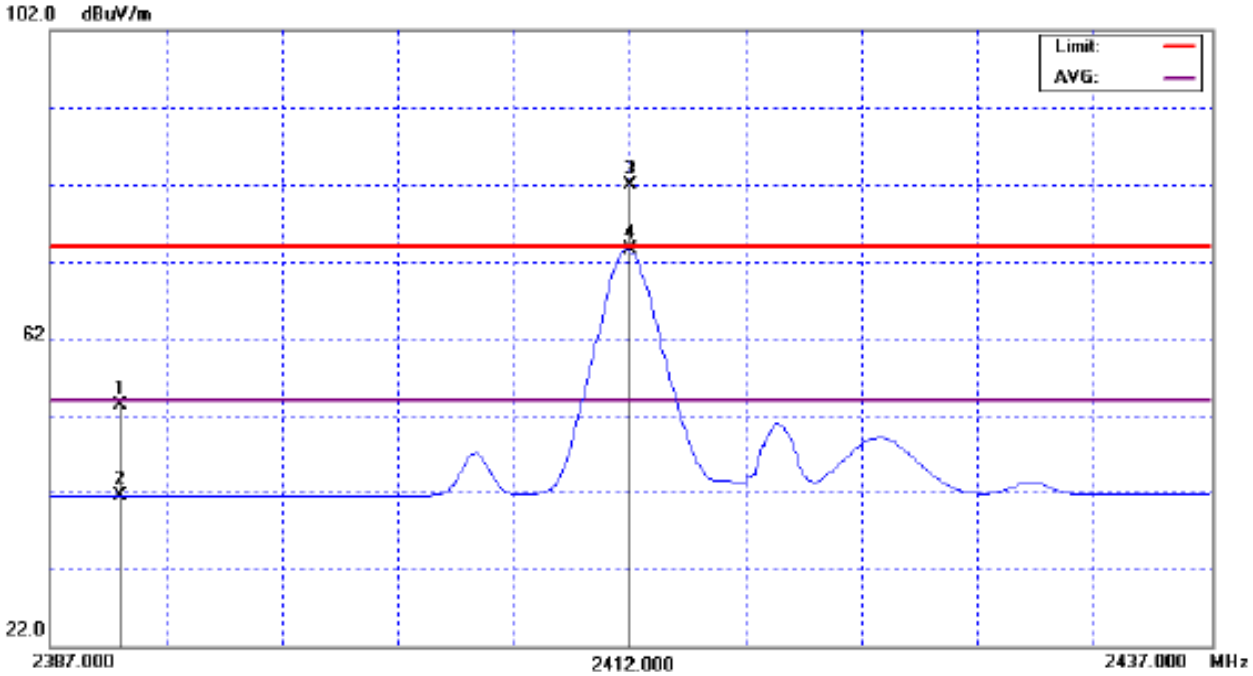
Remark：

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

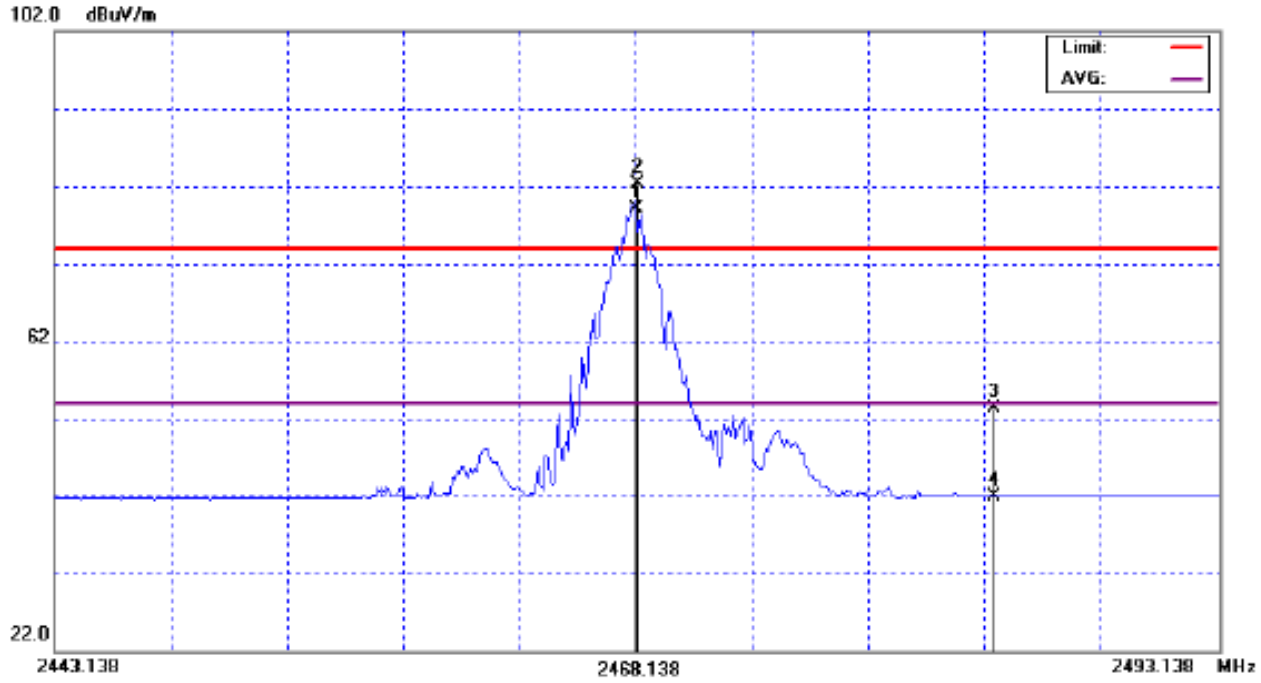
(2) EUT Orthogonal Axes：

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

TX CH01 (Restricted Bands Requirements, Horizontal)



TX CH04 (Restricted Bands Requirements, Horizontal)



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	100129	Jan. 07, 2009

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

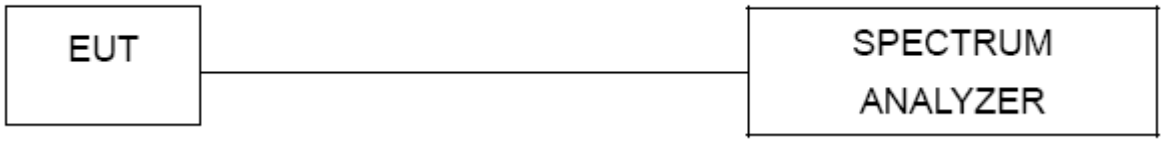
5.2 TEST PROCEDURE

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

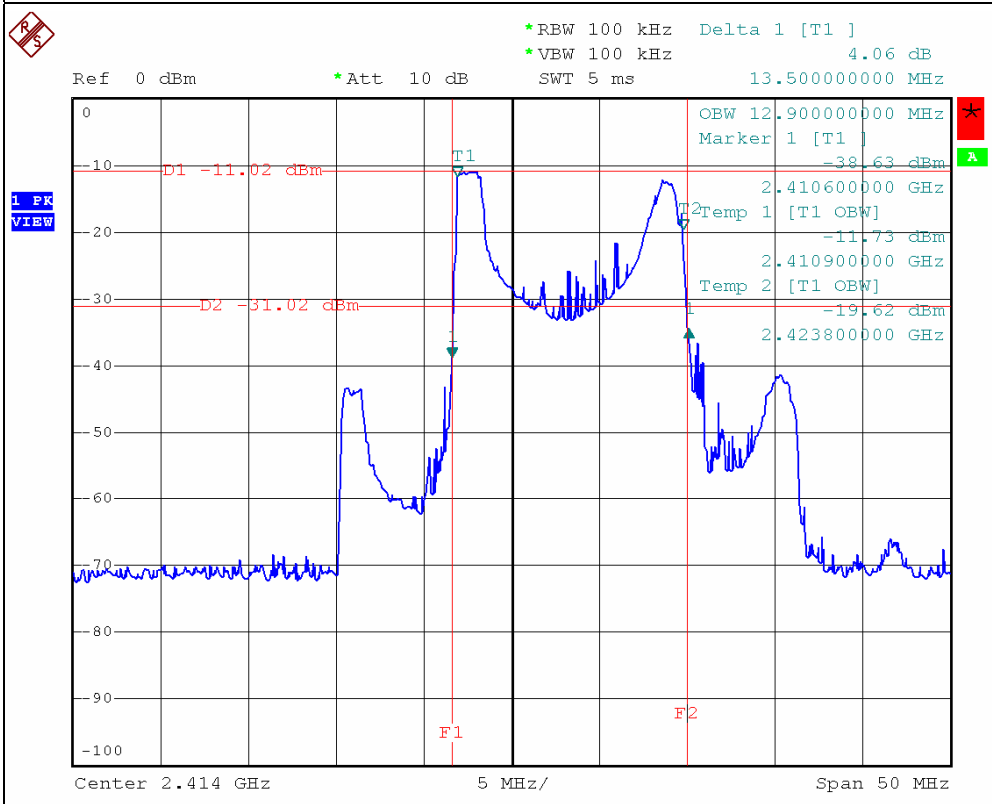
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

5.6 TEST RESULTS

EUT：	2.4G wireless transceiver	Model Name. ：	870VL
Temperature：	20℃	Relative Humidity：	60 %
Pressure：	1020 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX CH 01/02/04		

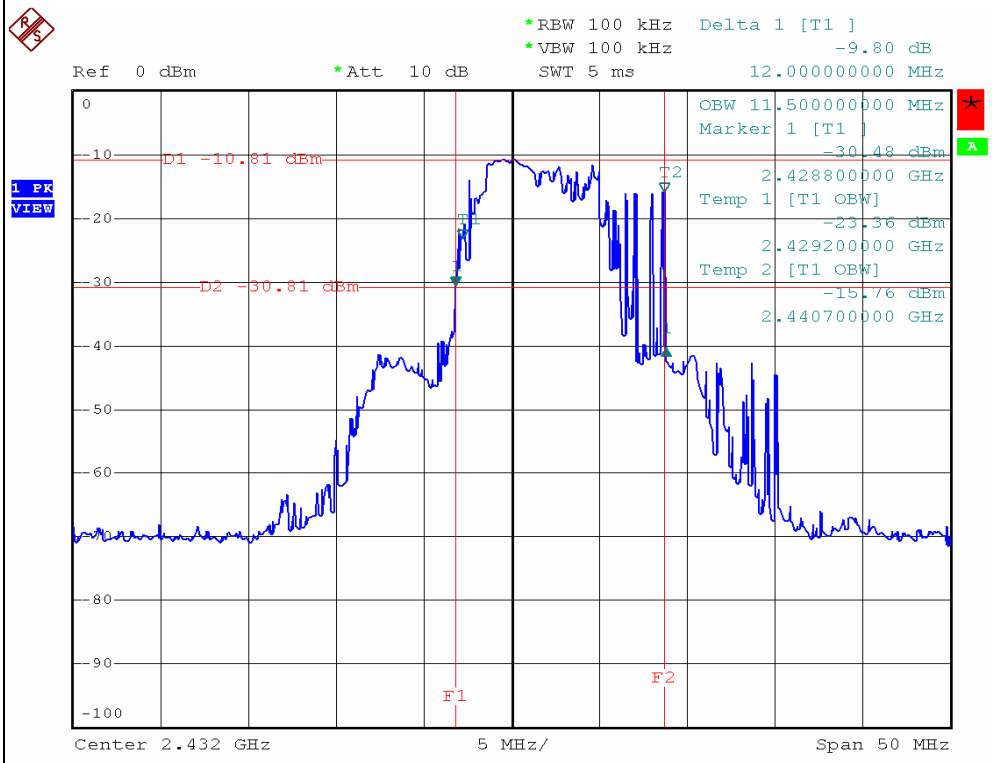
Test Channel	Frequency (MHz)	20 dBc Bandwidth (MHz)	99% occupied Bandwidth(MHz)
CH01	2414	13.50	12.90
CH02	2432	12.00	11.50
CH04	2468	11.30	10.00

TX CH01



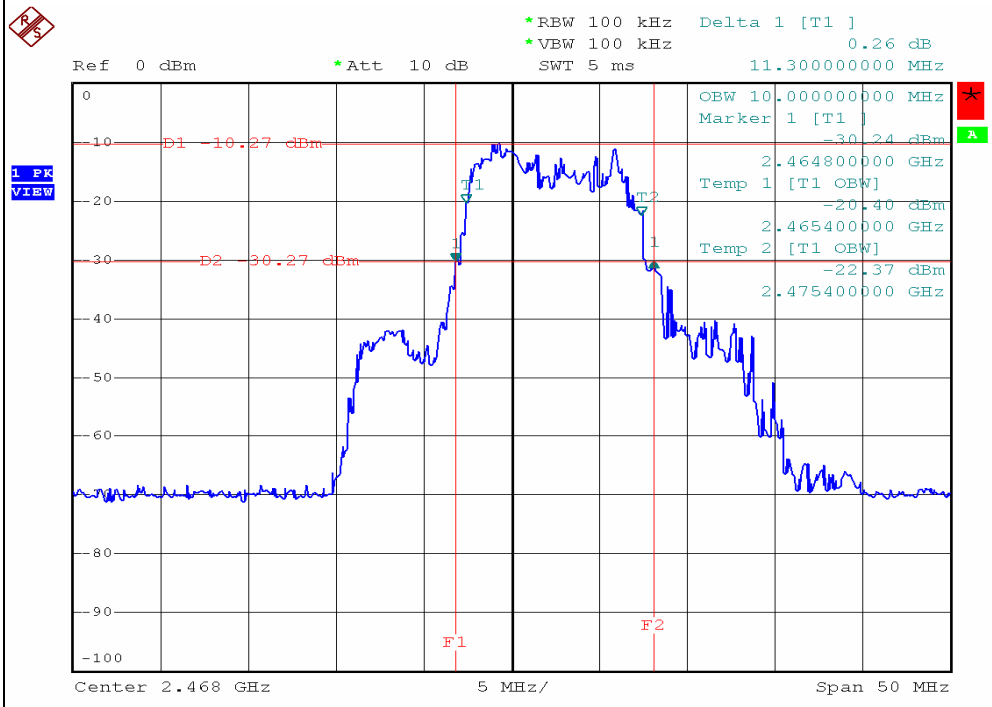
Date: 17.MAR.2008 03:24:38

TX CH 02



Date: 17.MAR.2008 03:27:34

TX CH 04



Date: 17.MAR.2008 03:31:37

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
8	Spectrum Analyzer	R&S	FSP_40	100129	Jan. 07, 2009

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

The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RB / VB (emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (other emission)	100 KHz /100 KHz for Peak

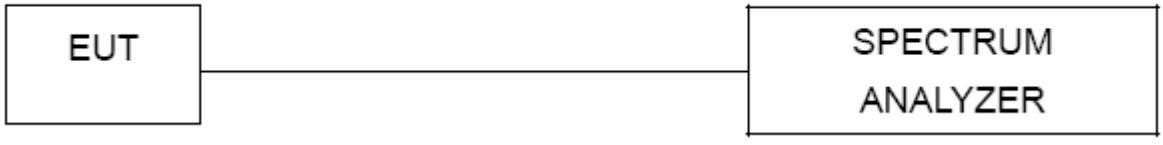
6.1.2 TEST PROCEDURE

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

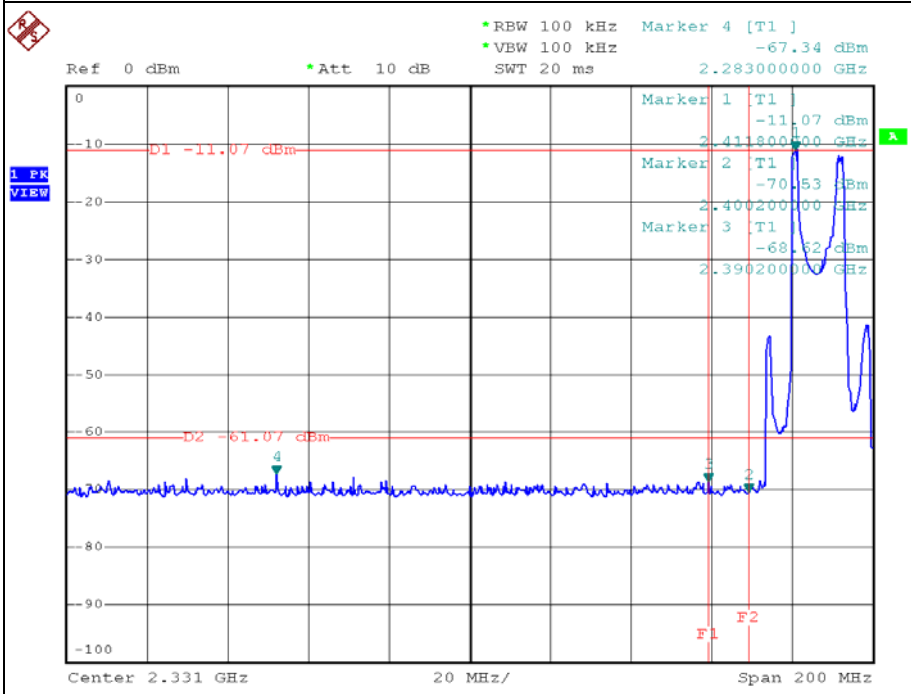
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

6.1.6 TEST RESULTS

EUT：	2.4G wireless transceiver	Model Name. ：	870VL
Temperature：	20℃	Relative Humidity：	60 %
Pressure：	1020 hPa	Test Power ：	AC 120V/60Hz
Test Mode ：	TX CH01, CH04		

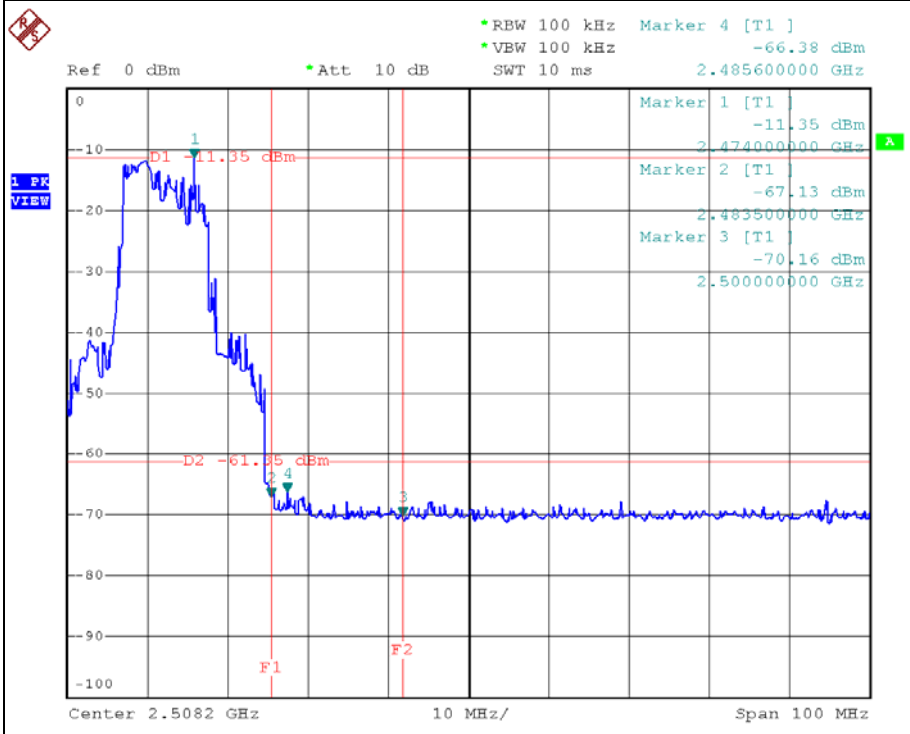
Channel of Worst Data: CH16			
The max. radio frequency power in any 100kHz bandwidth outside the frequency band		The max. radio frequency power in any 100 kHz bandwidth within the frequency band.	
FREQUENCY(MHz)	POWER(dBm)	FREQUENCY(MHz)	POWER(dBm)
2283.00	-67.34	2485.60	-66.38
Result			
In any 100kHz 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



Date: 17.MAR.2008 03:19:37

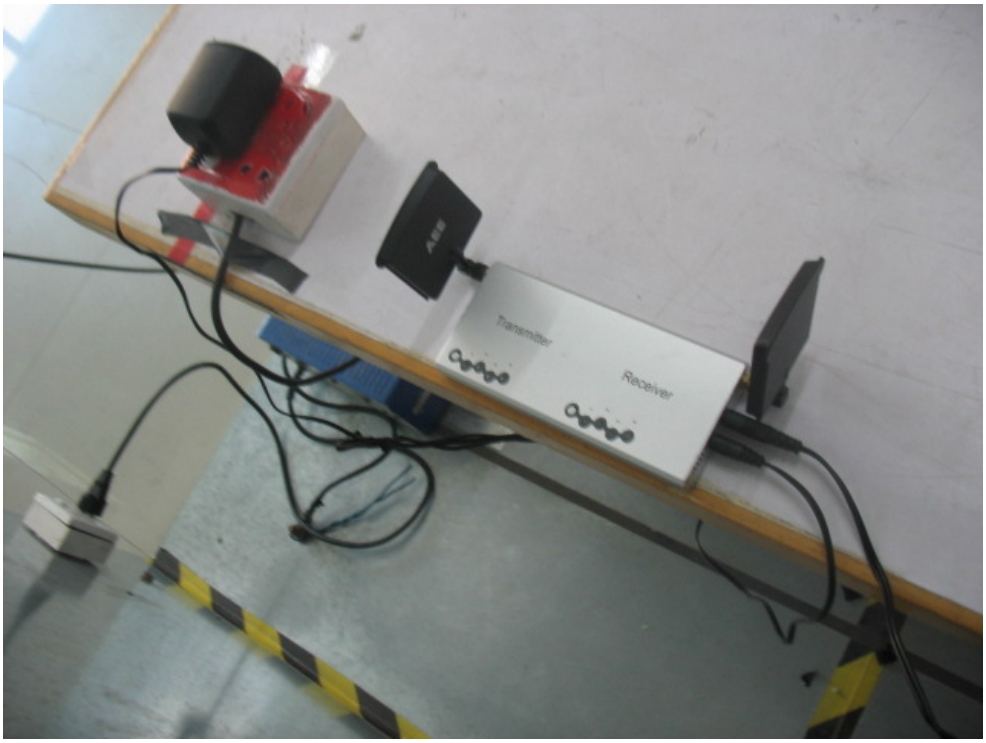
TX CH04



Date: 17.MAR.2008 03:17:09

7. EUT TEST PHOTO

Conducted Measurement Photos



Radiated Measurement Photos