FCC Radio Test Report

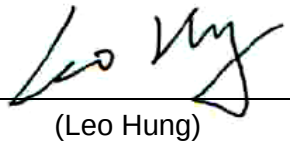
FCC ID: XW3DR9053RM

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

Issued Date	:	Mar. 19, 2013
Project No.	:	1303C028
Equipment	:	2.4GHz Nano Transceiver
Model Name	:	DR-9053RM; DR-9055RM
Applicant	:	Dongguan Siliten Electronics CO.,LTD.
Address	:	Sijia Yewu Industrial estate , Shijie Town ,Dongguan City ,Guangdong Province ,China

Tested by:
Neutron Engineering Inc. EMC Laboratory
Date of Receipt: Mar. 05, 2013
Date of Test:
Mar. 05, 2013 ~ Mar. 18, 2013

Testing Engineer : 
(David Mao)

Technical Manager : 
(Leo Hung)

Authorized Signatory : 
(Steven Lu)

Neutron Engineering Inc.

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

Declaration

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

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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	:	2.4GHz Nano Transceiver
Brand Name	:	Fujitsu
Model Name	:	DR-9053RM; DR-9055RM
Applicant	:	Dongguan Siliten Electronics CO.,LTD.
Date of Test	:	Mar. 05, 2013 ~ Mar. 18, 2013
Test Sample	:	Engineering Sample
Standards	:	FCC Part15, Subpart C(15.249)/ ANSI C63.4 : 2009

The above equipment has been tested and found compliance with the requirement of the relative standards by Neutron Engineering Inc. EMC Laboratory.
The test data, data evaluation, and equipment configuration contained in our test report (Ref No. NEI-FCCP-1-1303C028) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of 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)			
StandardSection FCC	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.209	Radiated Emission	PASS	
15.249	Radiated Spurious Emission	PASS	

NOTE:

(1)”N/A” denotes test is not applicable in this test report.

2.1 TEST FACILITY

The test facilities used to collect the test data in this report is **DG-C02/DG-CB03** at the location of No.3,Jinshagang 1st Road, ShiXia, Dalang Town,Dong Guan, China.523792
Neutron's test firm number for FCC 319330
Neutron's test firm number for IC 4428B-1

2.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

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

A. Conducted Measurement :

Test Site	Method	Measurement Frequency Range	U,(dB)	NOTE
DG-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	
		1GHz~18GHz	V	3.12	
		1GHz~18GHz	H	3.68	
		18GHz ~ 40GHz	V	4.04	
		18GHz ~ 40GHz	H	4.01	

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

<table>
<tr><td>Equipment</td><td>2.4GHz Nano Transceiver</td></tr>
<tr><td>Brand Name</td><td>Fujitsu</td></tr>
<tr><td>Model Name.</td><td>DR-9053RM; DR-9055RM</td></tr>
<tr><td>Model Difference</td><td>Only difference is model name.</td></tr>
<tr><td>Product Description</td><td>The EUT is a 2.4GHz Nano Transceiver.

<table><tr><td>Product Type</td><td>Low Power Communication Device</td></tr><tr><td>Operation Frequency</td><td>2408~2474 MHz</td></tr><tr><td>Modulation Technology</td><td>GFSK</td></tr><tr><td>Data rate</td><td>1Mbps</td></tr><tr><td>Number of Channel</td><td>34CH .Please see note 2. (Page 9)</td></tr><tr><td>Antenna Gain(Peak)</td><td>Please see note 3.(Page 9).</td></tr><tr><td>Field Strength</td><td>68.87 dBuV/m (AV Max.)</td></tr></table>
Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification. Please refer to the User's Manual.</td></tr>
<tr><td>Power Source</td><td>DC voltage supplied from system.</td></tr>
<tr><td>Power Rating</td><td>I/P AC 120V/60Hz O/P DC 5V</td></tr>
<tr><td>Connecting I/O Port(s)</td><td>Please refer to the User's Manual</td></tr>
</table>

Note:

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

2.

Frequency Channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	**2408**	10	2426	19	2444	28	2462
02	2410	11	2408	21	2446	29	2464
03	2412	12	2430	21	2448	30	2466
04	2414	13	2432	22	2450	31	2468
05	2416	14	2434	23	2452	32	2470
06	2418	15	2436	24	2454	33	2472
07	2420	16	2438	25	2456	**34**	**2474**
08	2422	**17**	**2440**	26	2458		
09	2424	18	2442	27	2460		

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Note
1	N/A	N/A	Printed Antenna	N/A	1.1	-

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	Wireless
Mode 2	Low – 2408MHz
Mode 3	Middle – 2440MHz
Mode 4	High -2474MHz

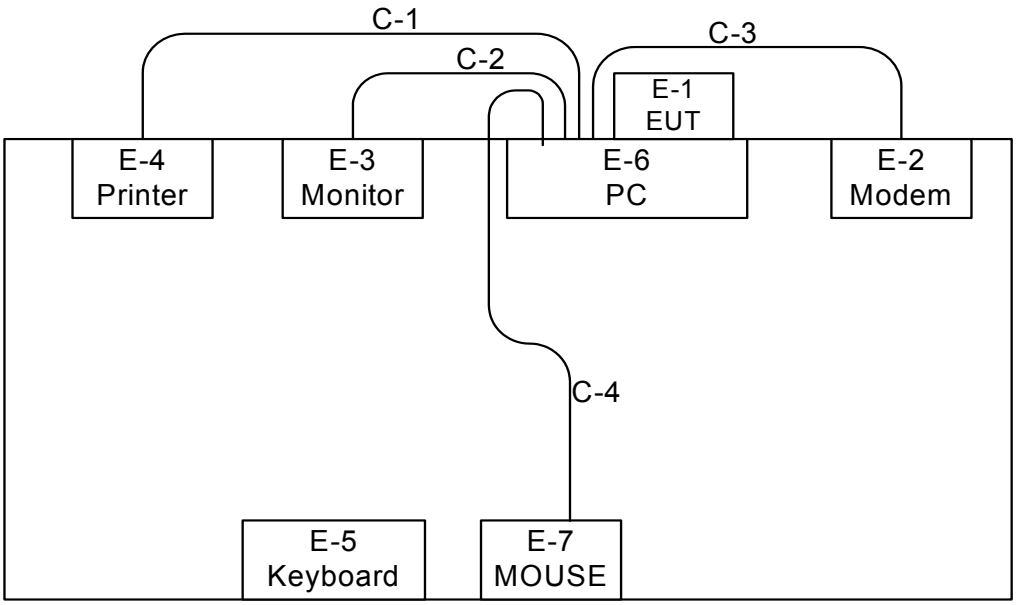
For Conducted Test	
Final Test Mode	Description
Mode 1	Wireless

For Radiated Test	
Final Test Mode	Description
Mode 2	Low – 2408MHz
Mode 3	Middle – 2440MHz
Mode 4	High -2474MHz

Note:
(1) The measurements are performed at the high, middle, low available channels.

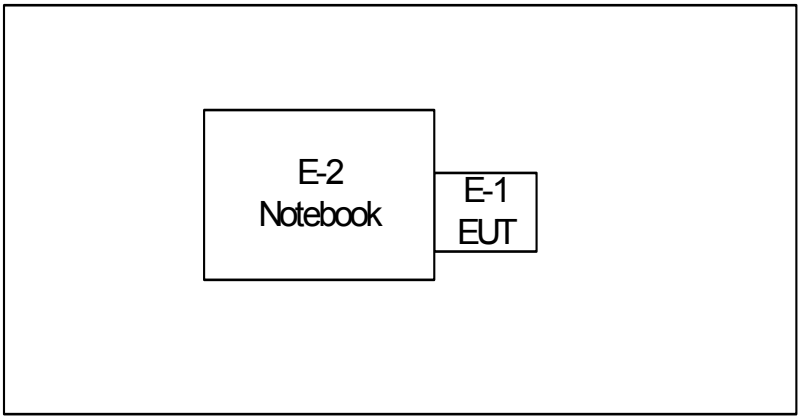
3.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conducted:



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

Radiated:



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	2.4GHz Nano Transceiver	Fujitsu	DR-9053RM	XW3DR9053RM	N/A	EUT
E-2	Modem	ACEEX	DM-1414V	IFAXDm1414	0603002131	
E-3	LCD monitor	Dell	E177FPc	DOC	CNOFJ179-64180-6AG-1WNS	
E-4	Printer	SII	DPU-414	DOC	3018507 B	
E-5	2.4GHz Wireless keyboard With Touch PAD	Genius	DK-7101RM	DOC	N/A	
E-6	PC	Dell 745	DCSM	DOC	G7K832X	
E-7	USB Mouse	Dell	MO56UOA	DOC	G01003HO	

Item	Shielded Type	Ferrite Core	Length	Note
C-1	YES	NO	1.5m	
C-2	YES	YES	1.5m	
C-3	YES	NO	0.9m	
C-4	YES	NO	1.5m	

Note:

(1) For detachable type I/O cable should be specified the length in m in『Length』column.

4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

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

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

Note:

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

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

4.1.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	LISN	EMCO	3816/2	00052765	May.04.2013
2	LISN	R&S	ENV216	100087	May.04.2013
3	Test Cable	N/A	C_17	N/A	Mar.28.2013
4	EMI TEST RECEIVER	R&S	ESCS30	826547/022	May.04.2013
5	50Ω Terminator	SHX	TF2-3G-A	08122902	May.04.2013

Remark: “N/A” denotes no model name, serial no. or calibration specified.

The following table is the setting of the receiver

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

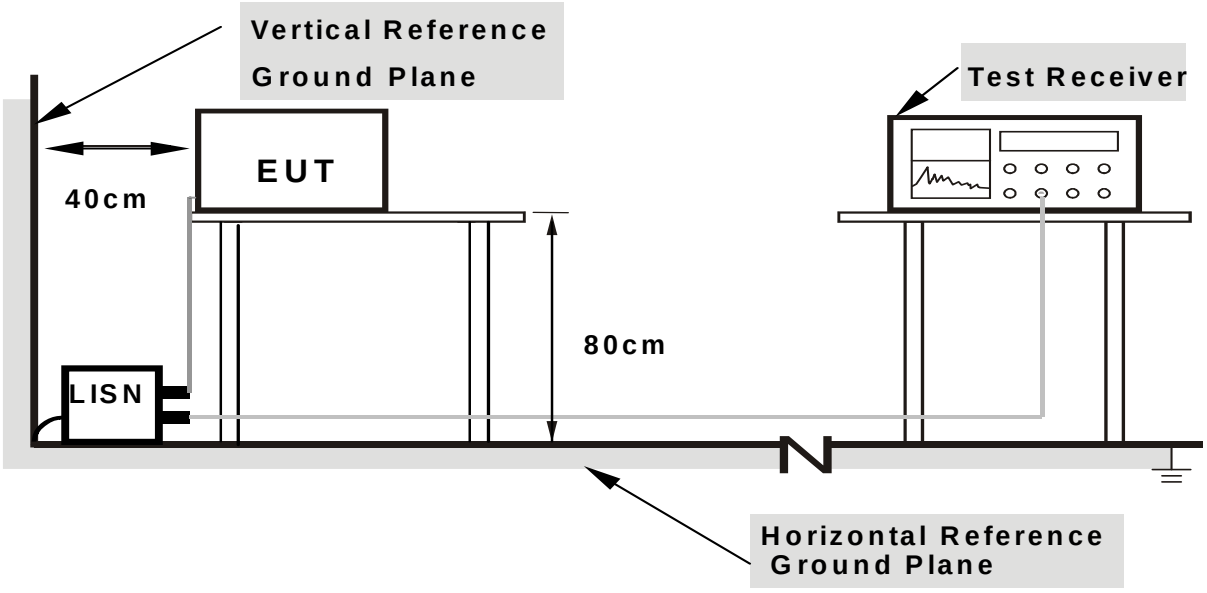
4.1.3 TEST PROCEDURE

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

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



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

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

4.1.6 EUT OPERATING CONDITIONS

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

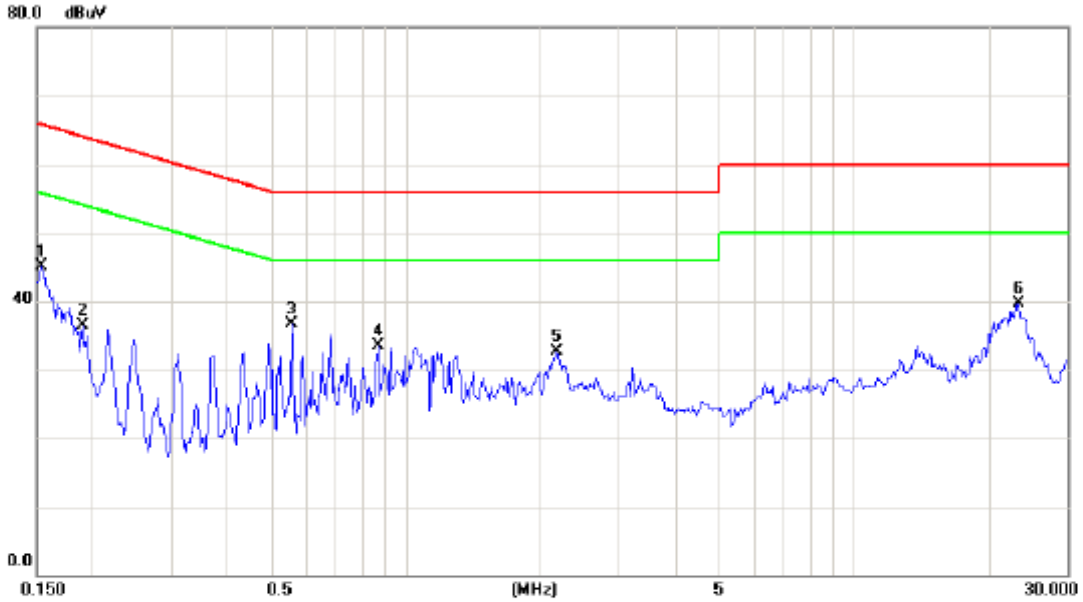
The EUT was programmed to be in continuously transmitting mode.

4.1.7 TEST RESULTS

Remark

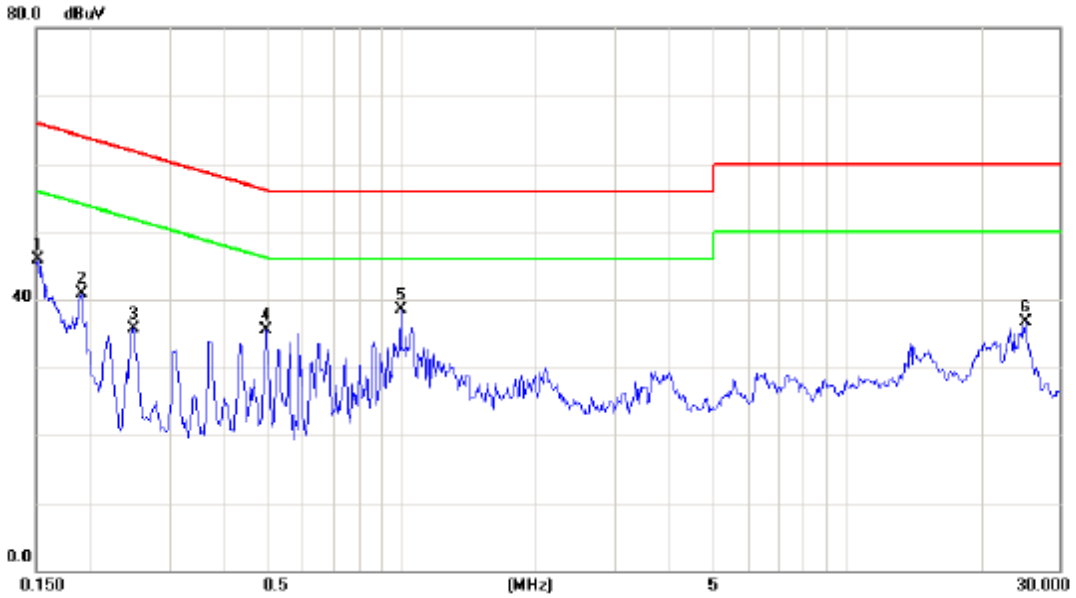
(1) All readings are QP Mode value unless otherwise stated AVG in column of『Note』. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform.In this case, 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.

EUT:	2.4GHz Nano Transceiver	Model Name. ：	DR-9053RM
Temperature:	28 ℃	Relative Humidity:	52 %
Test Power	AC 120V/60Hz	Phase:	Line
Test Mode:	Wireless		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1532	35.32	9.78	45.10	65.82	-20.72	peak	
2		0.1894	26.71	9.76	36.47	64.06	-27.59	peak	
3	*	0.5552	27.04	9.70	36.74	56.00	-19.26	peak	
4		0.8662	23.78	9.71	33.49	56.00	-22.51	peak	
5		2.1667	23.05	9.69	32.74	56.00	-23.26	peak	
6		23.2633	29.76	9.89	39.65	60.00	-20.35	peak	

EUT:	2.4GHz Nano Transceiver	Model Name. ：	DR-9053RM
Temperature:	28 ℃	Relative Humidity:	52 %
Test Power	AC 120V/60Hz	Phase:	Neutral
Test Mode:	Wireless		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1516	36.14	9.78	45.92	65.91	-19.99	peak	
2		0.1894	31.18	9.75	40.93	64.06	-23.13	peak	
3		0.2480	26.05	9.73	35.78	61.82	-26.04	peak	
4		0.4914	25.87	9.69	35.56	56.14	-20.58	peak	
5	*	0.9890	28.75	9.70	38.45	56.00	-17.55	peak	
6		25.1875	26.69	9.96	36.65	60.00	-23.35	peak	

4.2 RADIATED EMISSION MEASUREMENT

4.2.1 RADIATED EMISSION LIMITS (FCC 15.209)

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

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

Note:

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

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

LIMITS OF RADIATED EMISSION MEASUREMENT (FCC 15.209)

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

Notes:

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

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

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

LIMITS OF RADIATED EMISSION MEASUREMENT (FCC Part 15.249)

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

4.2.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	Schwarbeck	VULB9160	9160-3232	May.25.2013
2	Amplifier	HP	8447D	2944A09673	May.04.2013
3	Test Receiver	R&S	ESCI	100382	May.04.2013
4	Test Cable	N/A	C-01_CB03	N/A	Jul.01.2013
5	Antenna	ETS	3115	00075789	May.25.2013
6	Amplifier	Agilent	8449B	3008A02274	May.04.2013
7	Spectrum	Agilent	E4408B	US39240143	Nov.25.2013
8	Test Cable	HUBER+SUHNER	C-45	N/A	May.02.2013
9	Controller	CT	SC100	N/A	N/A
10	Active Loop Antenna	R&S	HFH2-Z2	830749/020	May.04.2013
11	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Oct.12.2013
12	Horn Antenna	EMCO	3115	9605-4803	May.25.2013

Remark: “N/A” denotes no model name, serial no. or calibration specified.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (emission in restricted band)	1 MHz / 1 MHz for Peak, Average=PK-duty cycle

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

Duty cycle: TX 2402MHz

Duty cycle = T_{ON} /(T_{ON} + T_{OFF})

T_{ON}: 16msec

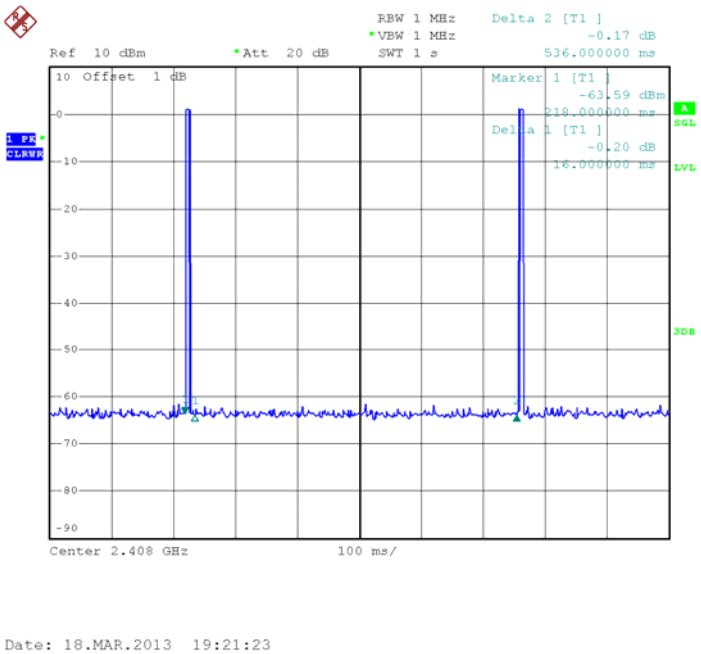
T_{ON} + T_{OFF}: (total time):536 msec

Duty cycle: 2.98%

AV=PK+20 log(Duty cycle)

AV=PK-30.5

Total time(T_{ON} + T_{OFF})= 27.9 msec



4.2.3 TEST PROCEDURE

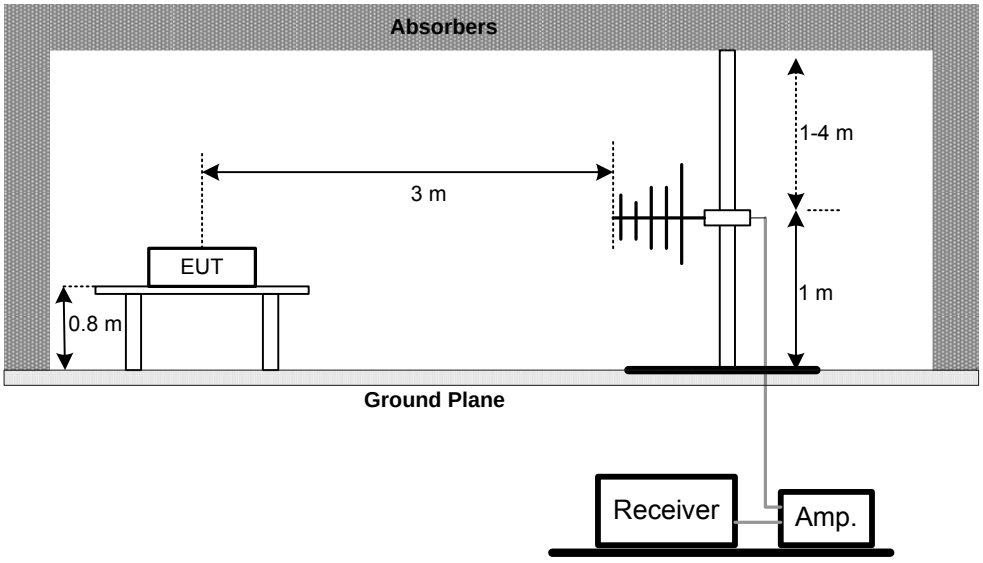
a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then AV 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

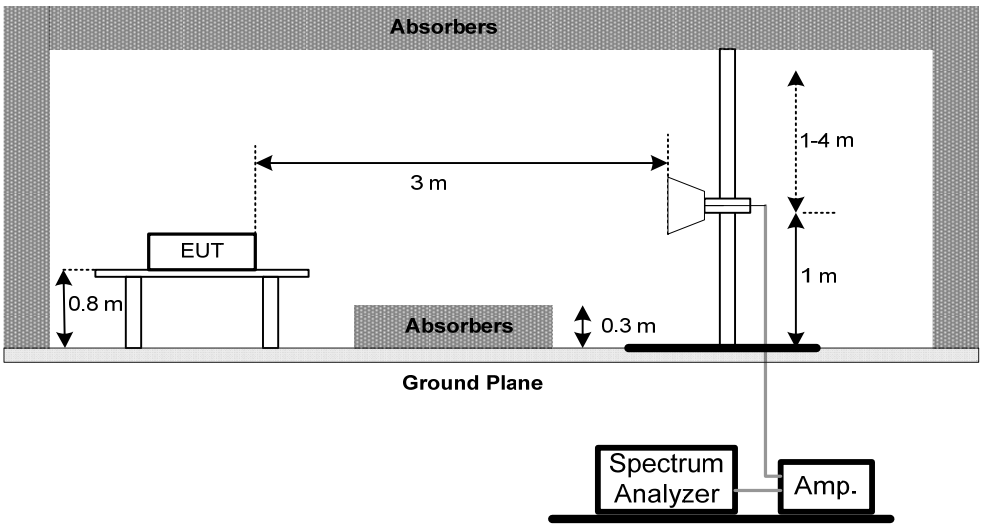
No deviation

4.2.5 TEST SETUP

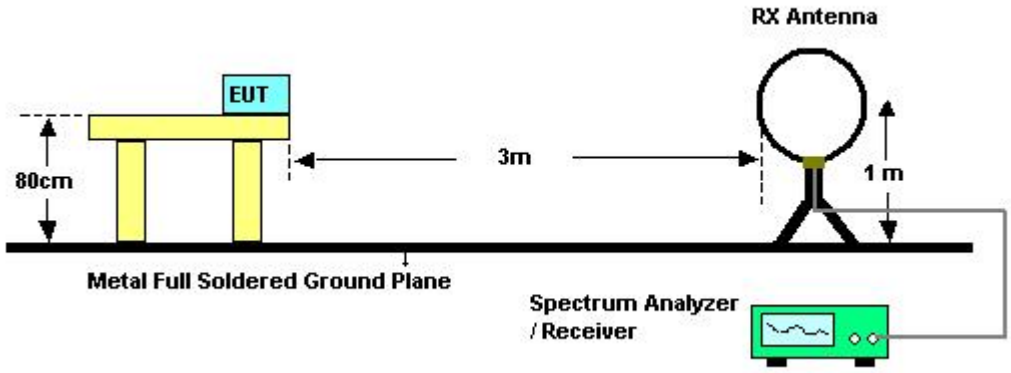
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



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



(C) For radiated emissions below 30MHz



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 (BELOW 30MHz)

EUT	2.4GHz Nano Transceiver	Model Name	DR-9053RM
Temperature	26℃	Relative Humidity	58 %
Pressure	1009 hPa	Test Power	AC 120V/60Hz
Test Mode	TX Mode 2408MHz		

Freq. (MHz)	Ant. 0°/90°	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
0.0949	0°	24.54	21.50	46.04	108.06	-62.02	QA
0.3625	0°	17.26	20.13	37.39	96.42	-59.03	AV
0.3625	0°	34.25	23.76	58.01	116.42	-58.41	PK
2.5623	0°	25.89	19.16	45.05	69.54	-24.49	QP
4.2354	0°	26.75	18.81	45.56	69.54	-23.98	QP
5.7123	0°	24.58	18.14	42.72	69.54	-26.82	QP
7.1754	0°	25.46	18.03	43.49	69.54	-26.05	QP

Freq. (MHz)	Ant. 0°/90°	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
0.0731	90°	16.57	21.94	38.51	110.32	-71.81	AV
0.0731	90°	31.23	21.19	52.42	130.32	-77.90	PK
0.5487	90°	24.55	19.96	44.51	72.82	-28.31	QP
1.4578	90°	24.77	19.55	44.32	64.33	-20.01	QP
2.0954	90°	27.06	19.44	46.50	69.54	-23.04	QP
6.9582	90°	25.78	18.04	43.82	69.54	-25.72	QP
8.8524	90°	24.86	17.89	42.75	69.54	-26.79	QP

Remark：

(1) The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.
(2) Distance extrapolation factor = 40 log (specific distance / test distance) (dB);.
(3) Limit line = specific limits (dBuV) + distance extrapolation factor..

4.2.8 TEST RESULTS (BETWEEN 30 – 1000 MHz)

Remark：

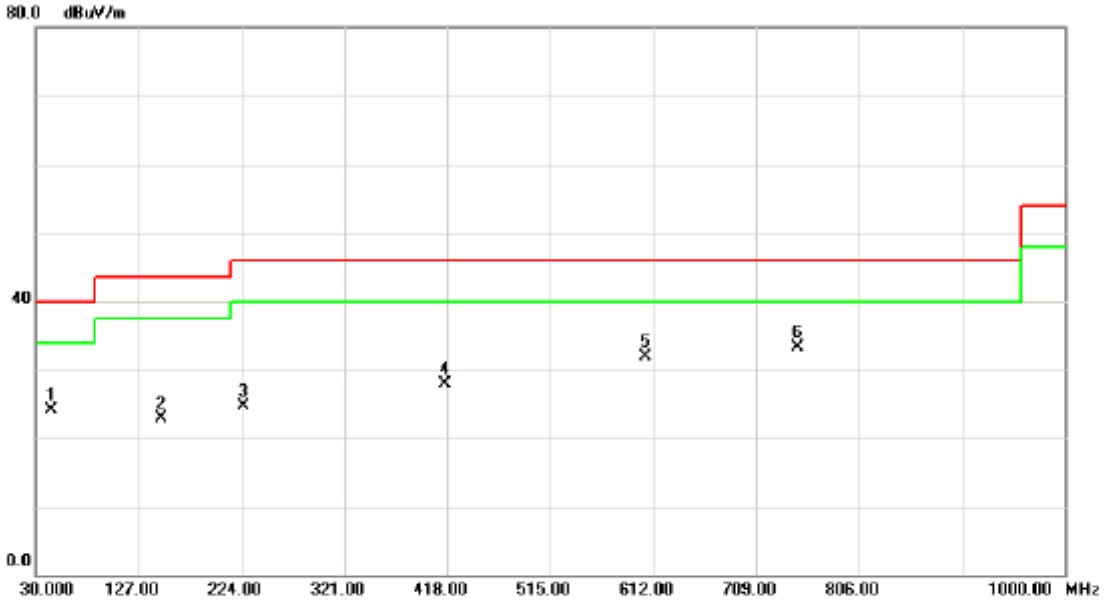
(1) All readings are Peak unless otherwise stated QP in column of『Note』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.

(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 .

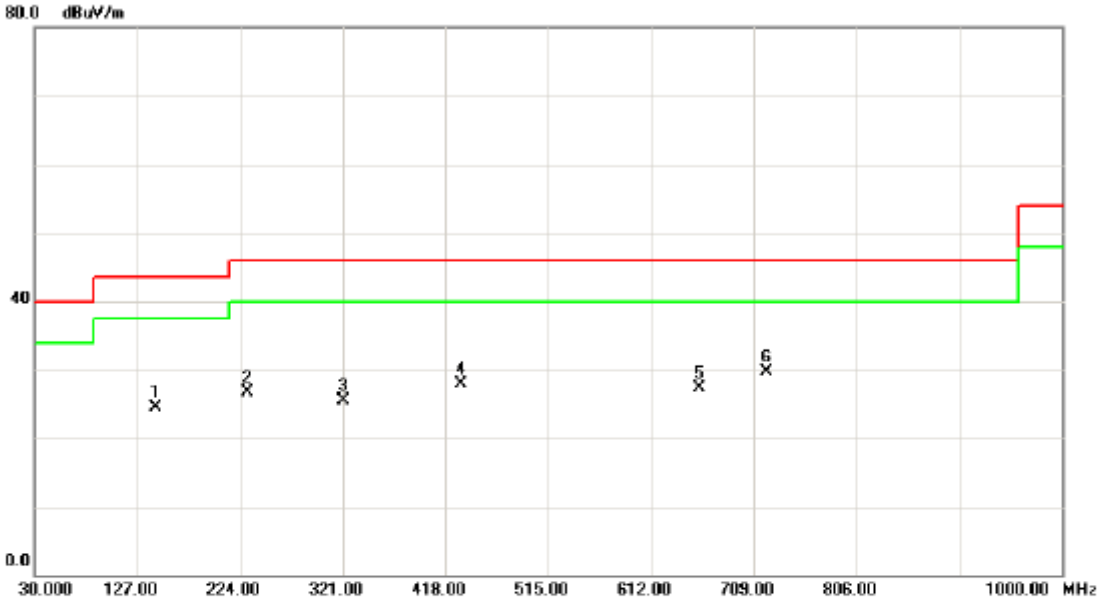
(4) Data of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

EUT	2.4GHz Nano Transceiver	Model Name	DR-9053RM
Temperature	25 ℃	Relative Humidity	65 %
Test Power	AC 120V/60Hz	Polarization:	Vertical
Test Mode	TX Mode 2408MHz		



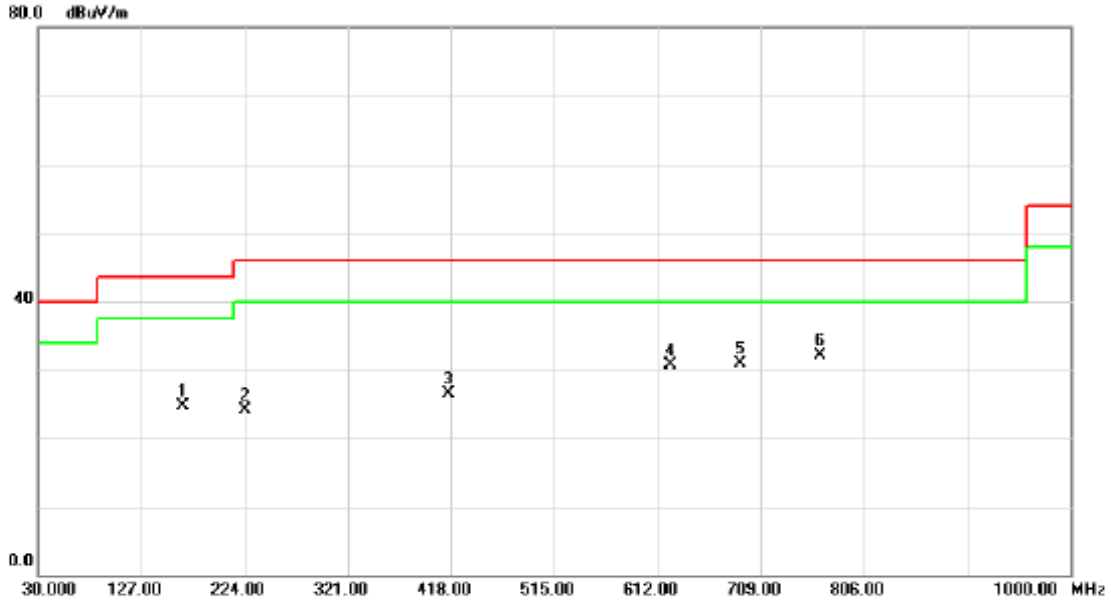
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		44.5500	41.03	-16.99	24.04	40.00	-15.96	peak	
2		148.8250	40.48	-17.58	22.90	43.50	-20.60	peak	
3		226.4250	40.36	-15.69	24.67	46.00	-21.33	peak	
4		415.5750	36.73	-8.74	27.99	46.00	-18.01	peak	
5		604.7250	36.01	-4.18	31.83	46.00	-14.17	peak	
6	*	747.8000	35.97	-2.59	33.38	46.00	-12.62	peak	

EUT	2.4GHz Nano Transceiver	Model Name	DR-9053RM
Temperature	25 ℃	Relative Humidity	65 %
Test Power	AC 120V/60Hz	Polarization:	Horizontal
Test Mode	TX Mode 2408MHz		



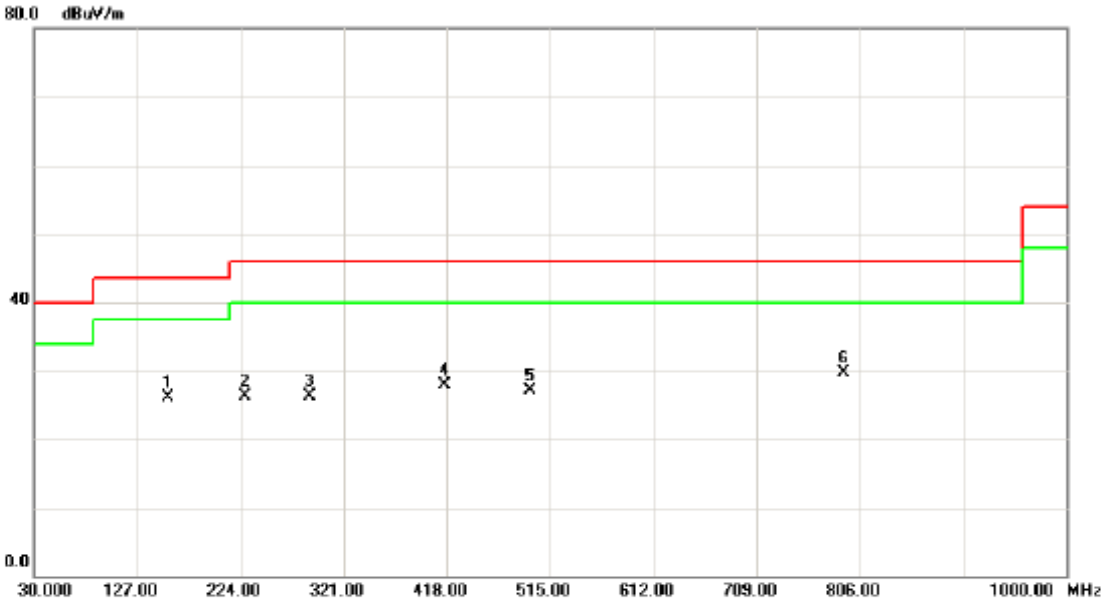
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		143.9750	42.17	-17.66	24.51	43.50	-18.99	peak	
2		231.2750	42.17	-15.56	26.61	46.00	-19.39	peak	
3		321.0000	37.02	-11.55	25.47	46.00	-20.53	peak	
4		432.5500	36.33	-8.43	27.90	46.00	-18.10	peak	
5		658.0750	30.52	-3.30	27.22	46.00	-18.78	peak	
6	*	721.1250	32.58	-2.92	29.66	46.00	-16.34	peak	

EUT	2.4GHz Nano Transceiver	Model Name	DR-9053RM
Temperature	25 ℃	Relative Humidity	65 %
Test Power	AC 120V/60Hz	Polarization:	Vertical
Test Mode	TX Mode 2440MHz		



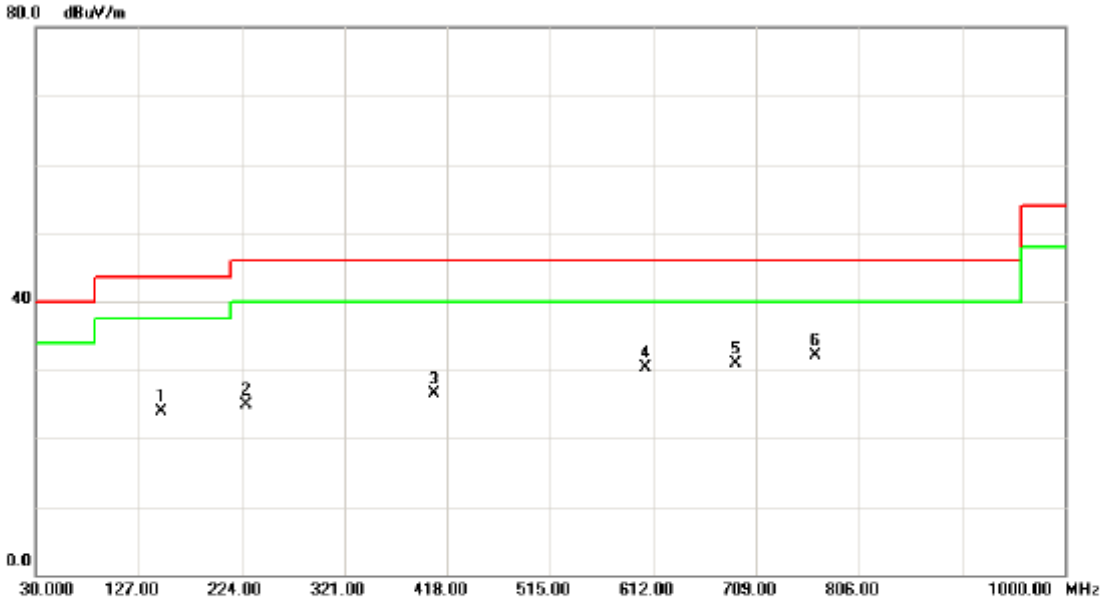
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		165.8000	42.21	-17.45	24.76	43.50	-18.74	peak	
2		224.0000	39.90	-15.76	24.14	46.00	-21.86	peak	
3		415.5750	35.23	-8.74	26.49	46.00	-19.51	peak	
4		624.1250	34.52	-3.82	30.70	46.00	-15.30	peak	
5		689.6000	34.17	-3.21	30.96	46.00	-15.04	peak	
6	*	764.7750	34.51	-2.36	32.15	46.00	-13.85	peak	

EUT	2.4GHz Nano Transceiver	Model Name	DR-9053RM
Temperature	25 ℃	Relative Humidity	65 %
Test Power	AC 120V/60Hz	Polarization:	Horizontal
Test Mode	TX Mode 2440MHz		



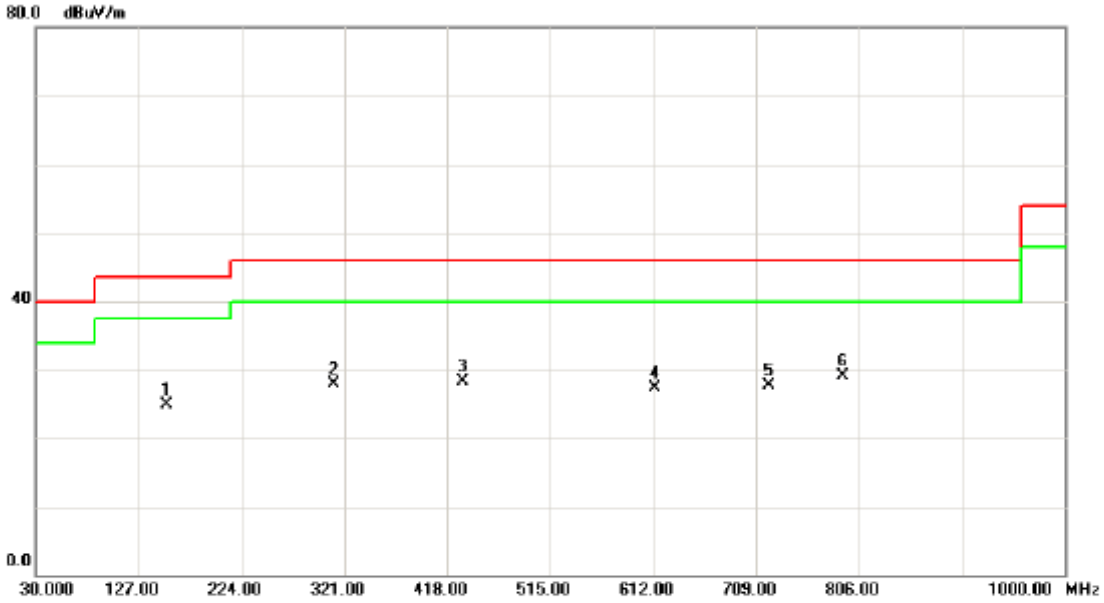
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		156.1000	43.74	-17.61	26.13	43.50	-17.37	peak	
2		228.8500	42.02	-15.63	26.39	46.00	-19.61	peak	
3		289.4750	38.32	-12.08	26.24	46.00	-19.76	peak	
4		415.5750	36.73	-8.74	27.99	46.00	-18.01	peak	
5		495.6000	34.48	-7.42	27.06	46.00	-18.94	peak	
6	*	791.4500	31.62	-2.00	29.62	46.00	-16.38	peak	

EUT	2.4GHz Nano Transceiver	Model Name	DR-9053RM
Temperature	25 ℃	Relative Humidity	65 %
Test Power	AC 120V/60Hz	Polarization:	Vertical
Test Mode	TX Mode 2474MHz		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		148.8250	41.48	-17.58	23.90	43.50	-19.60	peak	
2		228.8500	40.59	-15.63	24.96	46.00	-21.04	peak	
3		405.8750	35.33	-8.92	26.41	46.00	-19.59	peak	
4		604.7250	34.51	-4.18	30.33	46.00	-15.67	peak	
5		689.6000	34.17	-3.21	30.96	46.00	-15.04	peak	
6	*	764.7750	34.51	-2.36	32.15	46.00	-13.85	peak	

EUT	2.4GHz Nano Transceiver	Model Name	DR-9053RM
Temperature	25 ℃	Relative Humidity	65 %
Test Power	AC 120V/60Hz	Polarization:	Horizontal
Test Mode	TX Mode 2474MHz		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		153.6750	42.53	-17.58	24.95	43.50	-18.55	peak	
2		311.3000	39.72	-11.79	27.93	46.00	-18.07	peak	
3		432.5500	36.83	-8.43	28.40	46.00	-17.60	peak	
4		614.4250	31.23	-4.00	27.23	46.00	-18.77	peak	
5		721.1250	30.58	-2.92	27.66	46.00	-18.34	peak	
6	*	791.4500	31.12	-2.00	29.12	46.00	-16.88	peak	

4.2.9 TEST RESULTS (ABOVE 1000 MHz)

EUT	2.4GHz Nano Transceiver	Model Name	DR-9053RM
Temperature	24 ℃	Relative Humidity	56 %
Pressure	1009 hPa	Test Power	AC 120V/60Hz
Test Mode	TX 2408MHz		

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	24.30	-6.20	32.28	56.58	26.08	74.00	54.00	X/E
2402.00	V	39.63	9.13	32.27	71.90	41.40	74.00	54.00	
2407.50	**V**	**67.11**	**36.61**	**32.26**	**99.37**	**68.87**	**114.00**	**94.00**	**X/F**
4816.06	V	42.13	11.63	6.11	48.24	17.74	74.00	54.00	X/H

Remark：

(1) All readings are Peak unless otherwise stated QP in column of『Note』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.

(2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency."F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)

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

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

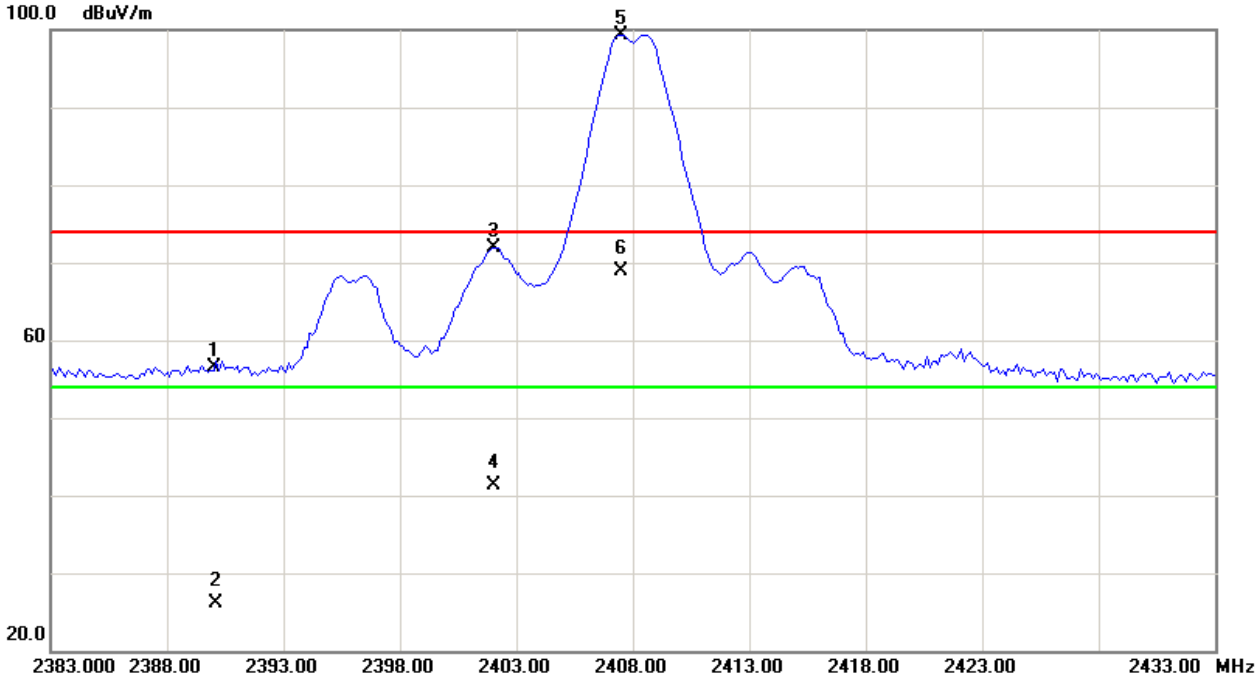
(5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

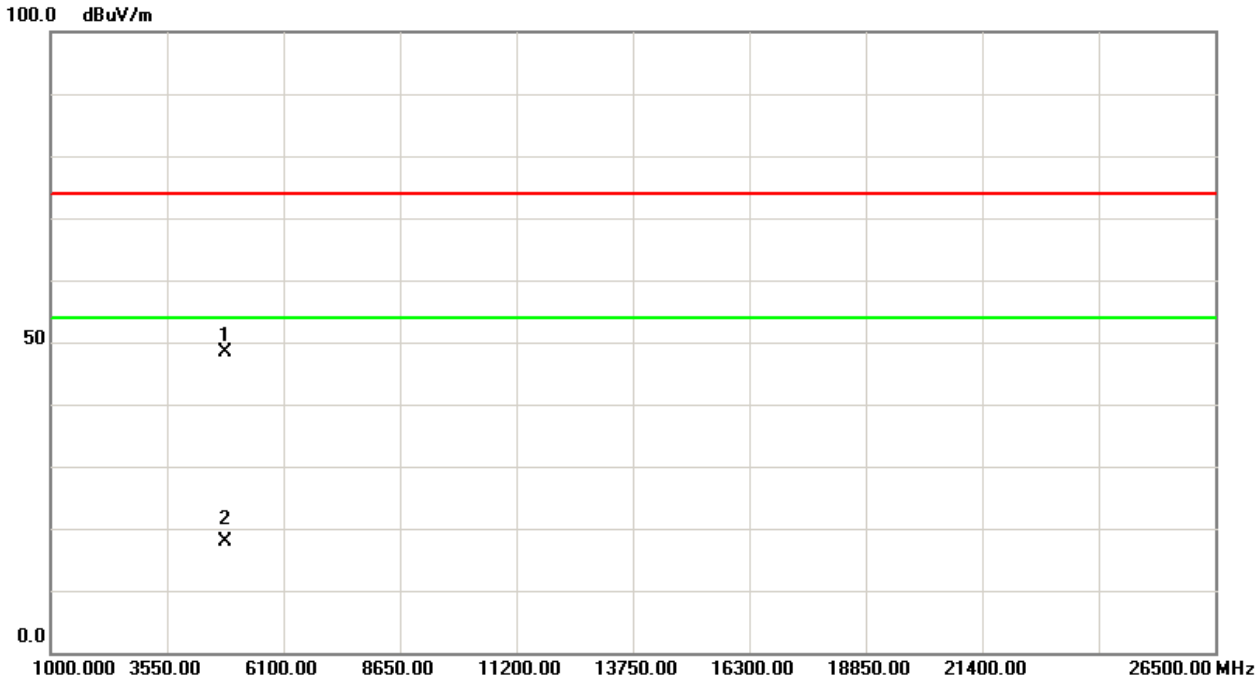
(6) EUT Orthogonal Axis：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

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

(8) The average value of fundamental frequency is:
Average = Peak value + 20log(Duty cycle) ,Final AV= PK-30.5

Orthogonal Axis：X
TX 2408MHz (Above 1000 MHz, Vertical)





EUT	2.4GHz Nano Transceiver	Model Name	DR-9053RM
Temperature	24 ℃	Relative Humidity	56 %
Pressure	1009 hPa	Test Power	AC 120V/60Hz
Test Mode	TX 2408MHz		

Freq.	Ant.Pol.	Reading		Ant./CF	Act.		Limit		Note
		Peak	AV		Peak	AV	Peak	AV	
(MHz)	H/V	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	
2390.00	H	23.52	-6.98	32.28	55.80	25.30	74.00	54.00	X/E
2402.00	H	39.07	8.57	32.27	71.34	40.84	74.00	54.00	X/F
2407.50	**H**	**64.09**	**33.59**	**32.26**	**96.35**	**65.85**	**114.00**	**94.00**	**X/F**
4816.21	H	13.99	44.49	6.17	20.16	50.66	74.00	54.00	X/H

Remark：

(1) All readings are Peak unless otherwise stated QP in column of『Note』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.

(2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency."F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)

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

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

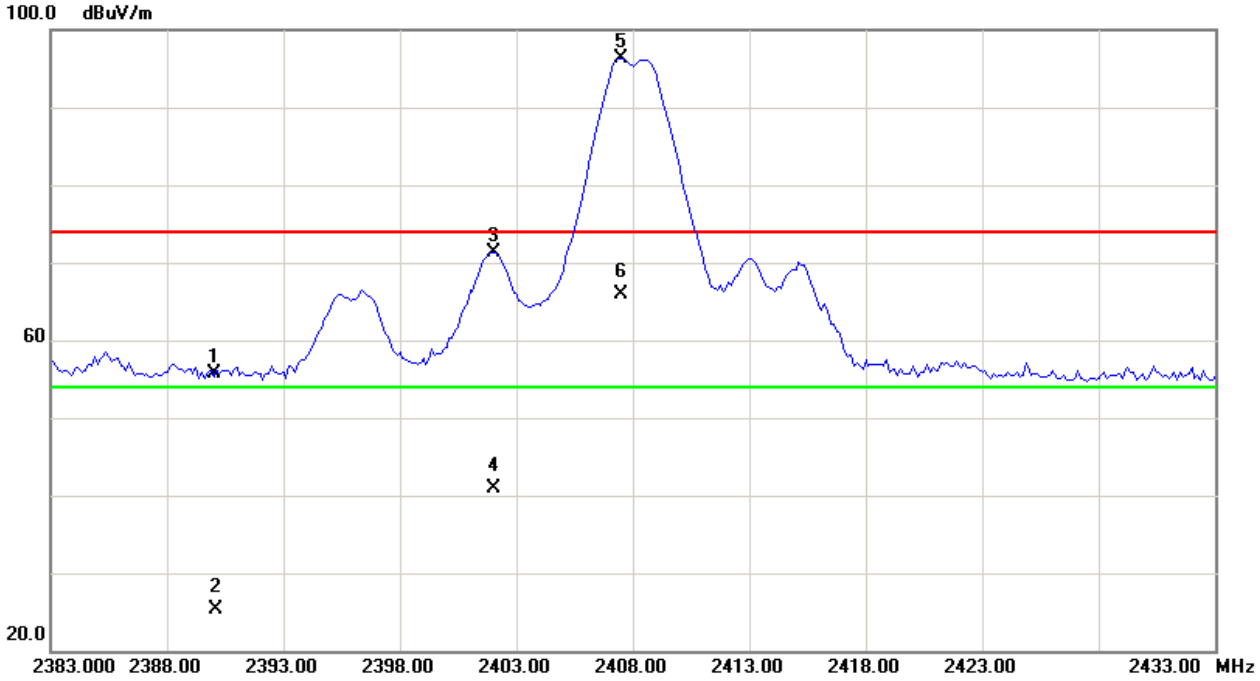
(5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

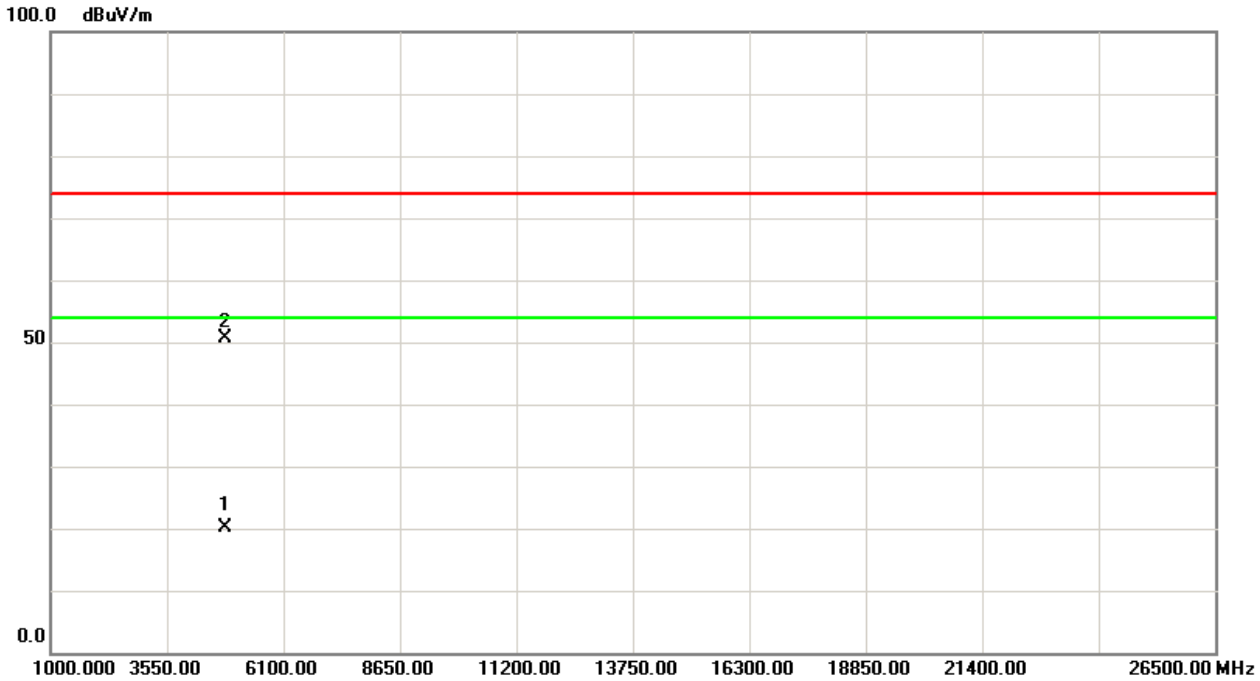
(6) EUT Orthogonal Axis：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

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

(8) The average value of fundamental frequency is:
Average = Peak value + 20log(Duty cycle) ,Final AV= PK-30.5

Orthogonal Axis：X
TX 2408MHz (Above 1000 MHz, Horizontal)





EUT	2.4GHz Nano Transceiver	Model Name	DR-9053RM
Temperature	24 ℃	Relative Humidity	56 %
Pressure	1009 hPa	Test Power	AC 120V/60Hz
Test Mode	TX 2440MHz		

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)	
2439.50	**V**	**65.81**	**35.31**	**32.22**	**98.03**	**67.53**	**114.00**	**94.00**	**X/F**
4880.12	V	42.46	11.96	6.42	48.88	18.38	74.00	54.00	X/H

Remark：

(1) All readings are Peak unless otherwise stated QP in column of『Note』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.

(2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency."F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)

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

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

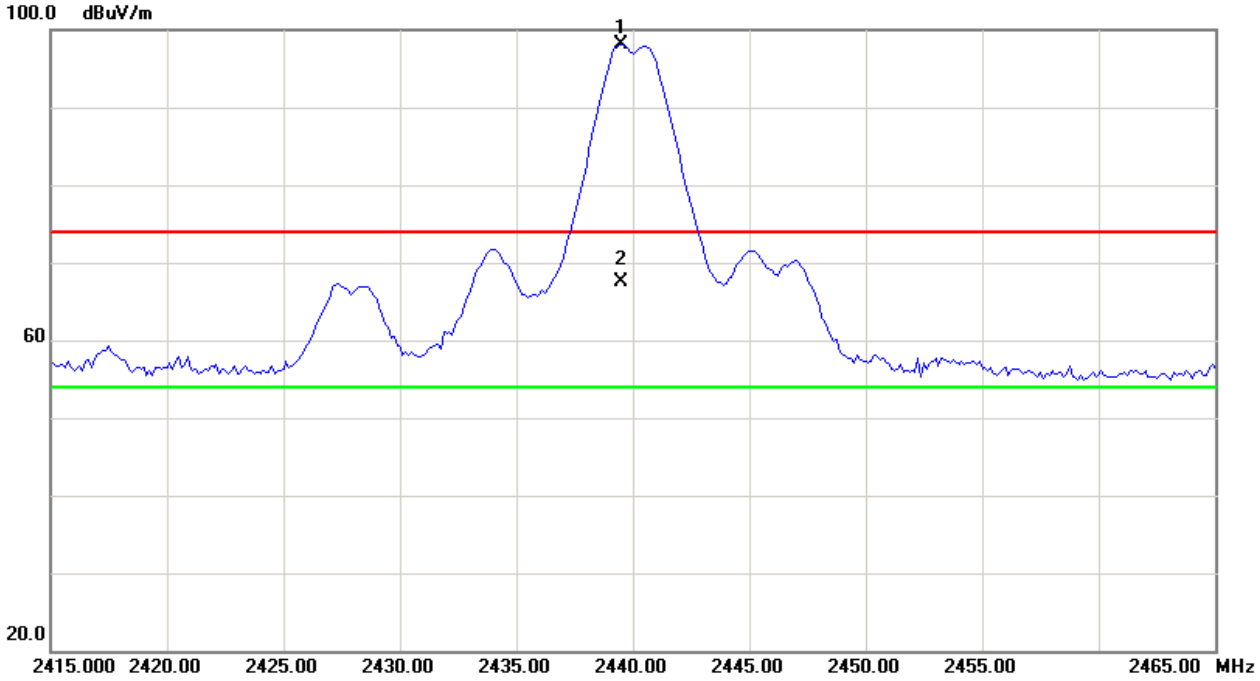
(5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

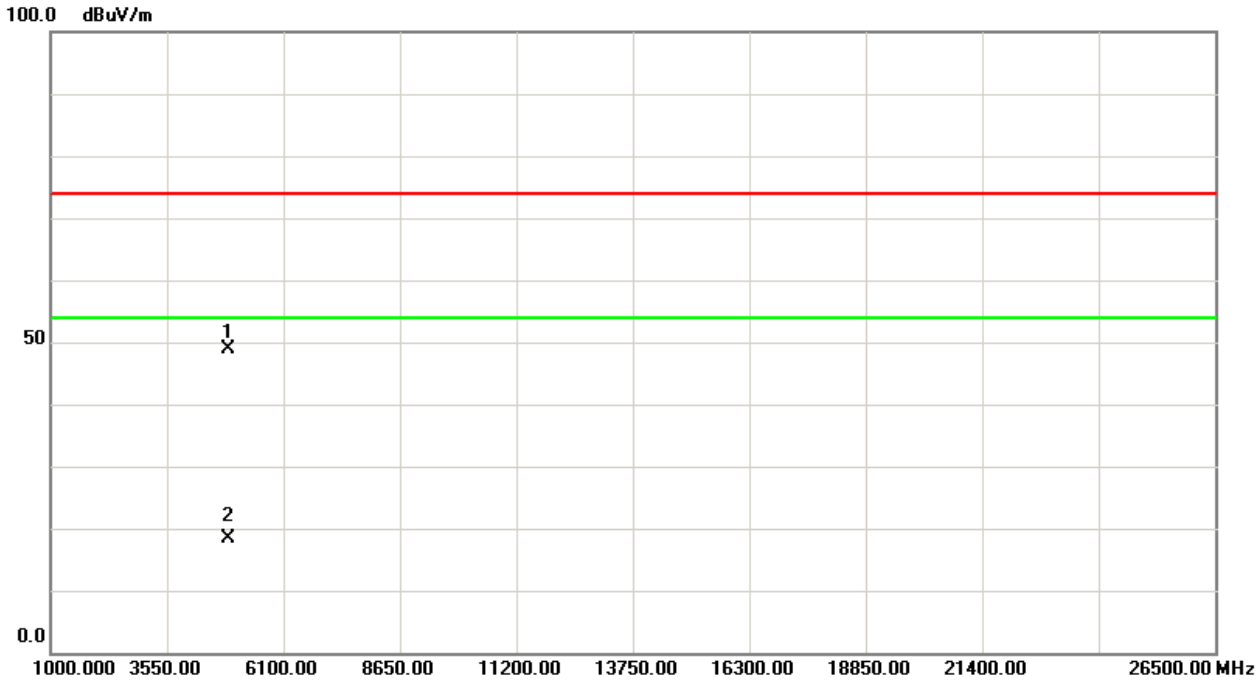
(6) EUT Orthogonal Axis：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

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

(8) The average value of fundamental frequency is:
Average = Peak value + 20log(Duty cycle) ,Final AV= PK-30.5

Orthogonal Axis：X
TX 2440 MHz (Above 1000 MHz, Vertical)





EUT	2.4GHz Nano Transceiver	Model Name	DR-9053RM
Temperature	24 ℃	Relative Humidity	56 %
Pressure	1009 hPa	Test Power	AC 120V/60Hz
Test Mode	TX 2440MHz		

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)	
2439.50	**H**	**62.19**	**31.69**	**32.22**	**94.41**	**63.91**	**114.00**	**94.00**	**X/F**
4880.17	H	47.25	16.75	6.42	53.67	23.17	74.00	54.00	X/H

Remark：

(1) All readings are Peak unless otherwise stated QP in column of『Note』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.

(2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency."F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)

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

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

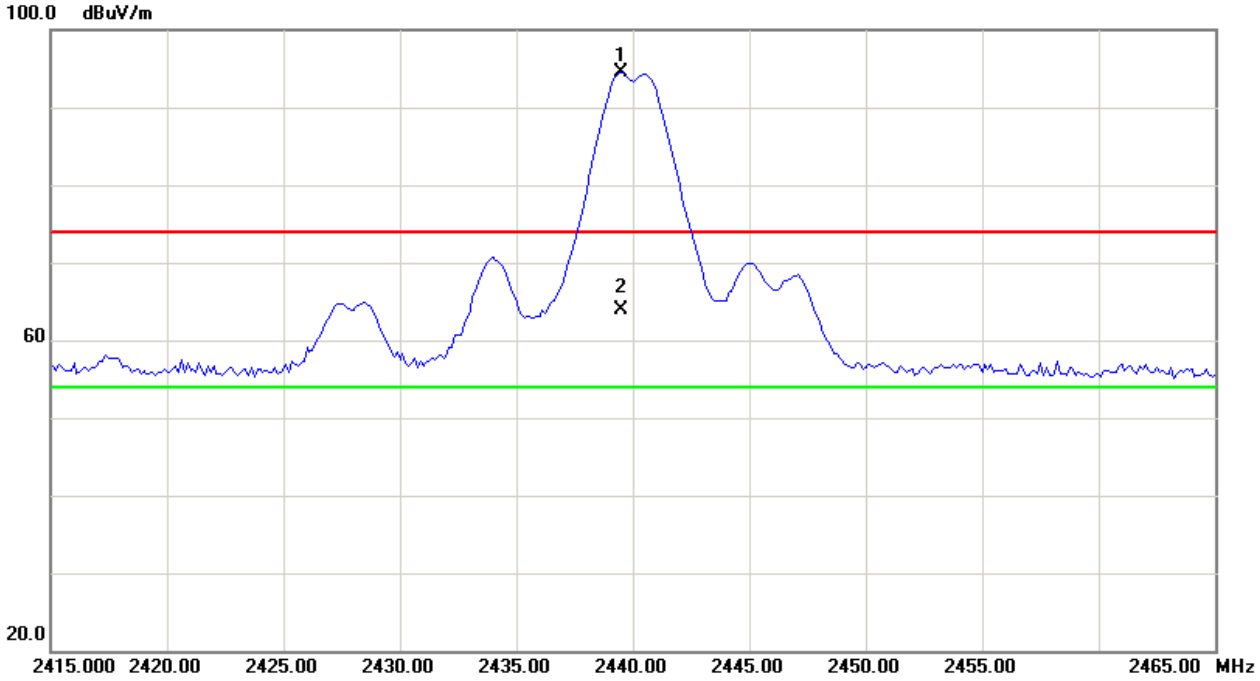
(5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

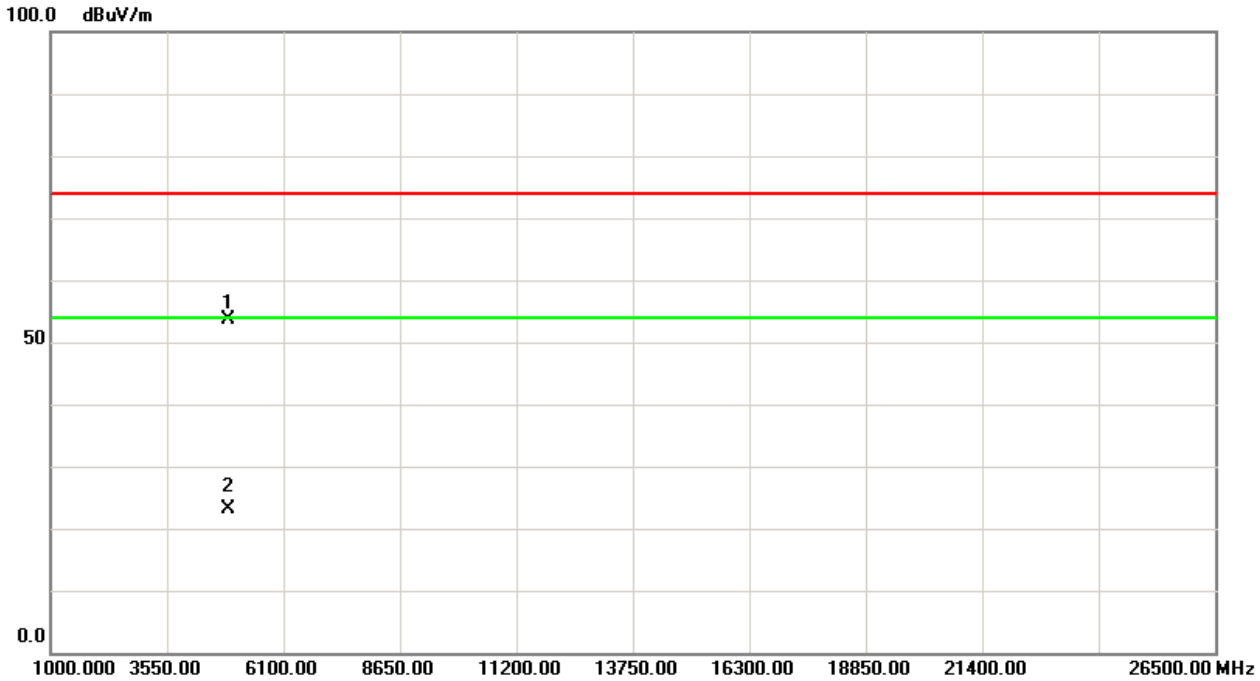
(6) EUT Orthogonal Axis：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

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

(8) The average value of fundamental frequency is:
Average = Peak value + 20log(Duty cycle) ,Final AV= PK-30.5

Orthogonal Axis：X
TX 2440MHz (Above 1000 MHz, Horizontal)





EUT	2.4GHz Nano Transceiver	Model Name	DR-9053RM
Temperature	24 ℃	Relative Humidity	56 %
Pressure	1009 hPa	Test Power	AC 120V/60Hz
Test Mode	TX 2474MHz		

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)	
2473.50	**V**	**64.86**	**34.36**	**32.19**	**97.05**	**66.55**	**114.00**	**94.00**	**X/F**
2483.50	V	24.65	-5.85	32.17	56.82	26.32	74.00	54.00	X/E
4948.04	V	41.89	11.39	6.70	48.59	18.09	74.00	54.00	X/H

Remark：

(1) All readings are Peak unless otherwise stated QP in column of『Note』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.

(2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency."F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)

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

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

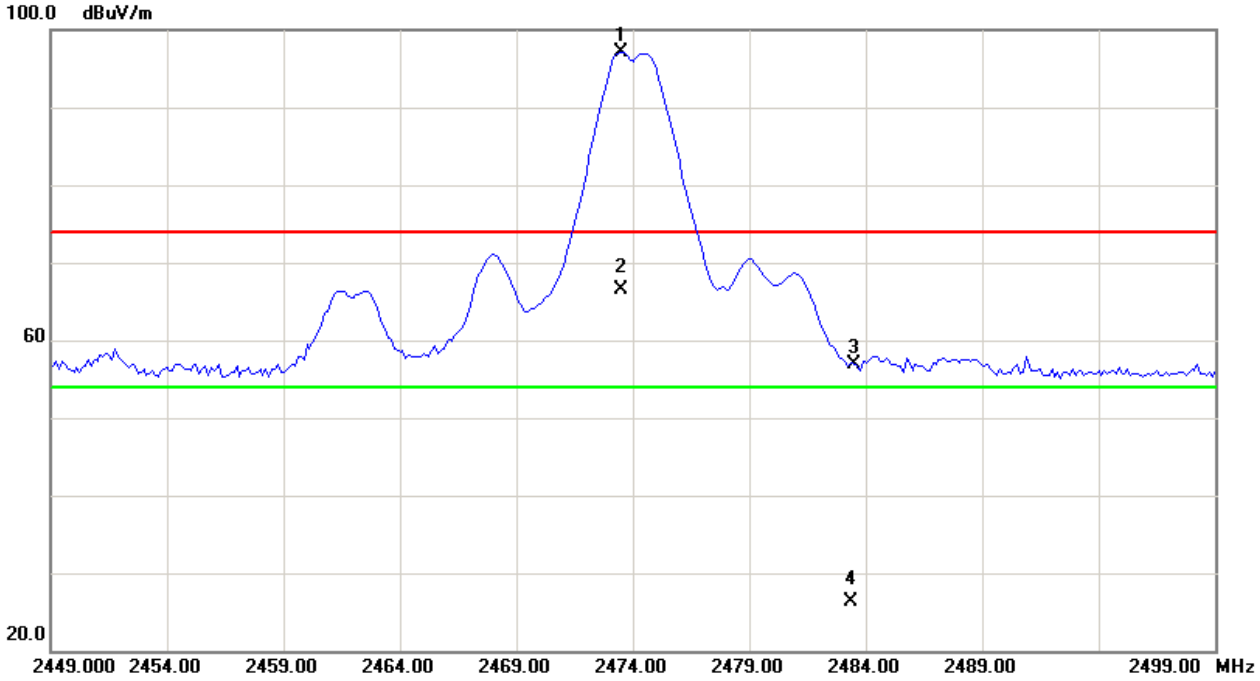
(5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

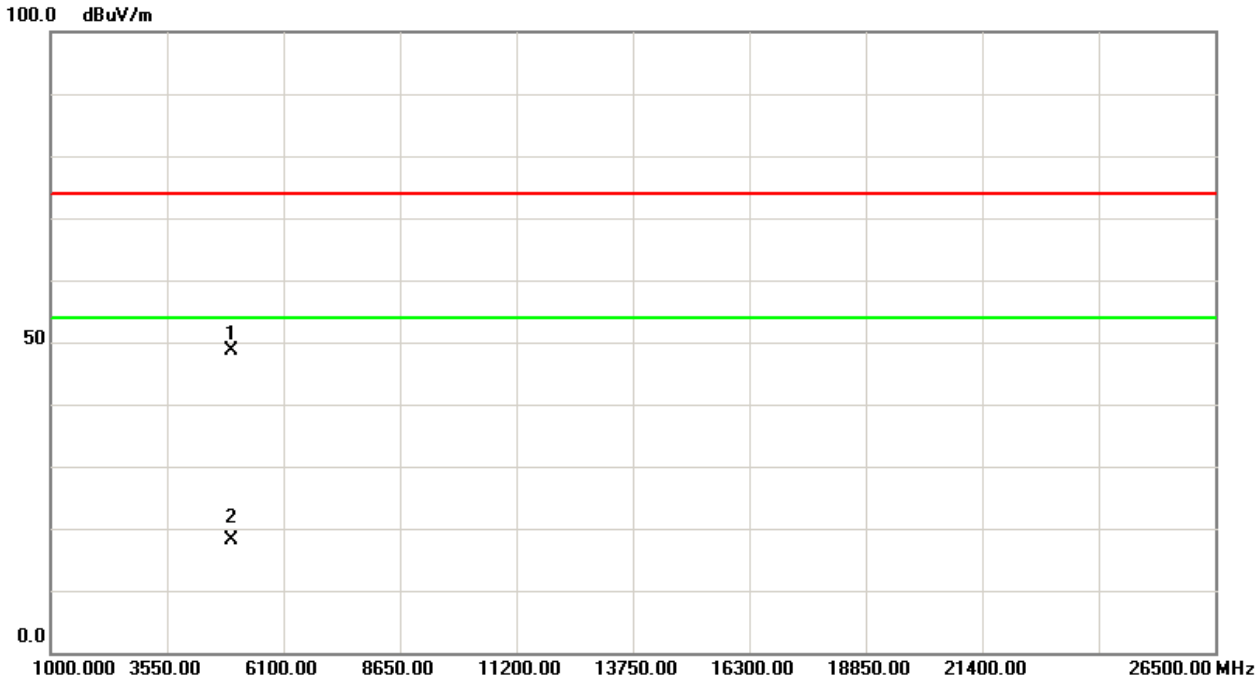
(6) EUT Orthogonal Axis：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

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

(8) The average value of fundamental frequency is:
Average = Peak value + 20log(Duty cycle) ,Final AV= PK-30.5

Orthogonal Axis：X
TX 2474MHz (Above 1000 MHz, Vertical)





EUT	2.4GHz Nano Transceiver	Model Name	DR-9053RM
Temperature	24 ℃	Relative Humidity	56 %
Pressure	1009 hPa	Test Power	AC 120V/60Hz
Test Mode	TX 2474MHz		

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)	
2473.50	**H**	**61.01**	**30.51**	**32.19**	**93.20**	**62.70**	**114.00**	**94.00**	**X/F**
2483.50	H	23.02	-7.48	32.17	55.19	24.69	74.00	54.00	X/E
4948.00	H	46.02	15.52	6.70	52.72	22.22	74.00	54.00	X/H

Remark：

(1) All readings are Peak unless otherwise stated QP in column of『Note』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.

(2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency."F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)

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

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

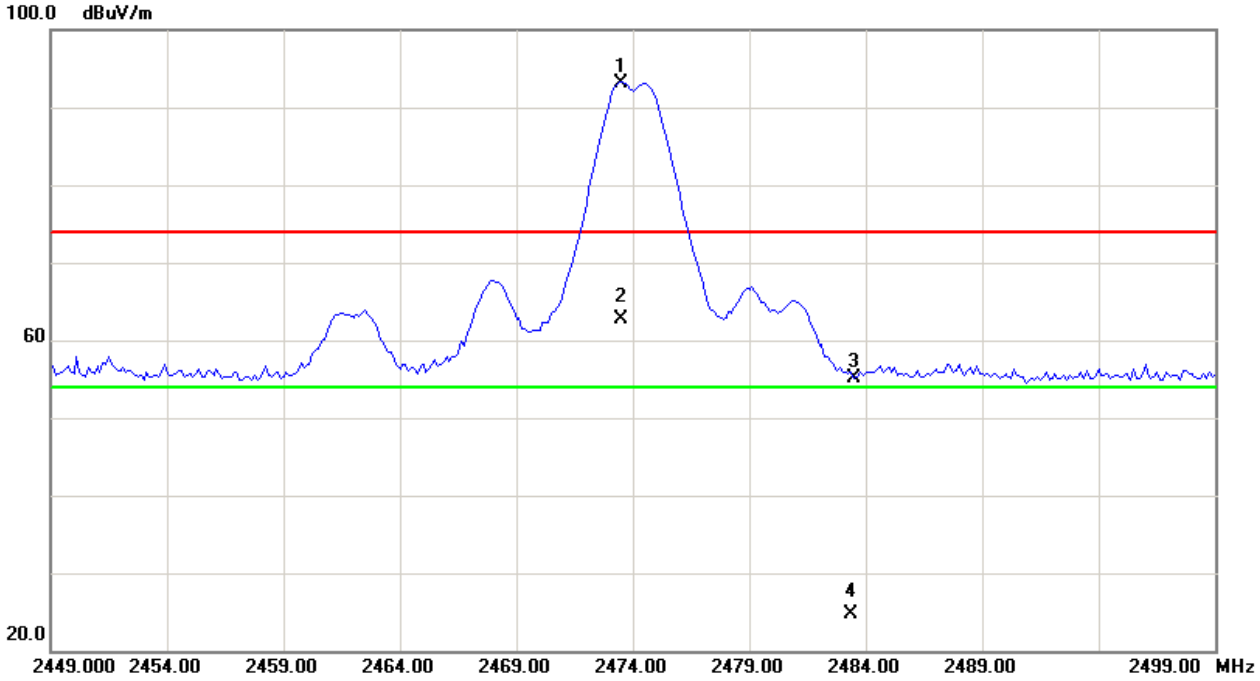
(5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

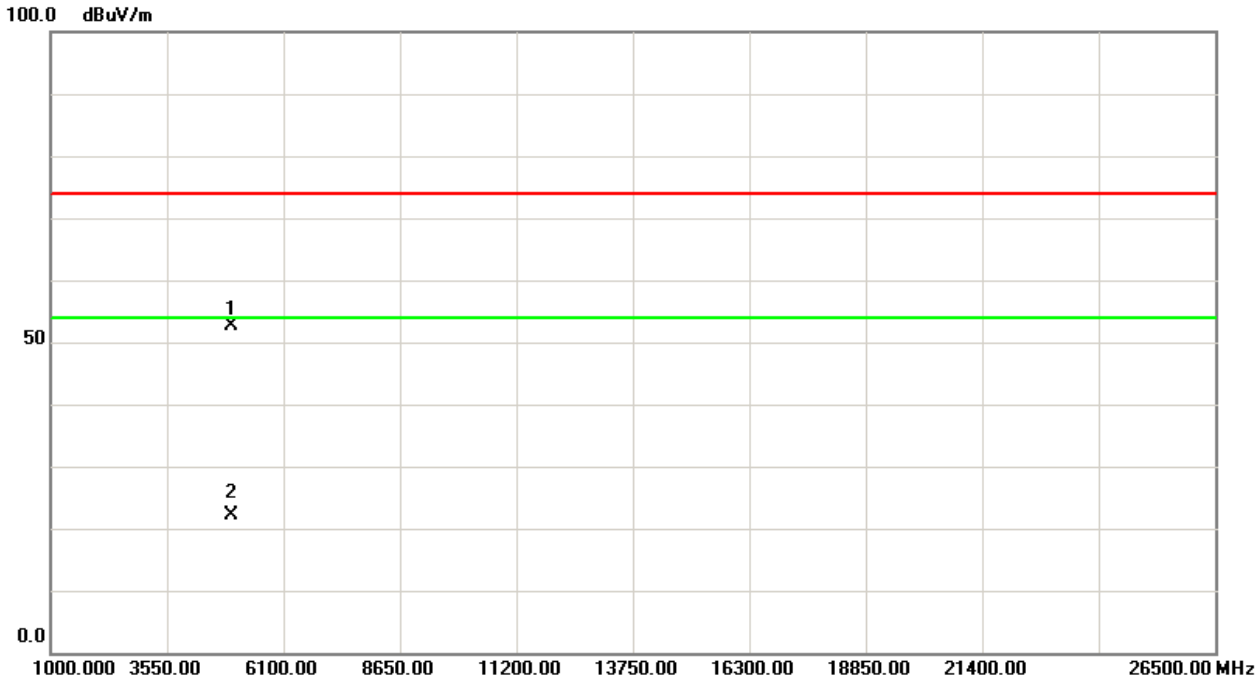
(6) EUT Orthogonal Axis：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

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

(8) The average value of fundamental frequency is:
Average = Peak value + 20log(Duty cycle) ,Final AV= PK-30.5

Orthogonal Axis：X
TX 2474MHz (Above 1000 MHz, 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	100185	Nov.25.2013

Remark: “N/A” denotes no model name, serial no. or calibration specified.

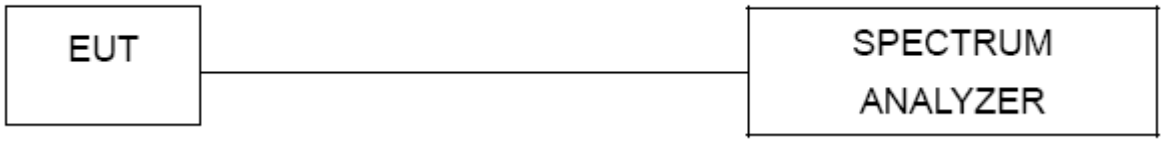
5.2 TEST PROCEDURE

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 = Auto.

5.3 DEVIATION FROM STANDARD

No deviation.

5.4 TEST SETUP



5.5 EUT OPERATION CONDITIONS

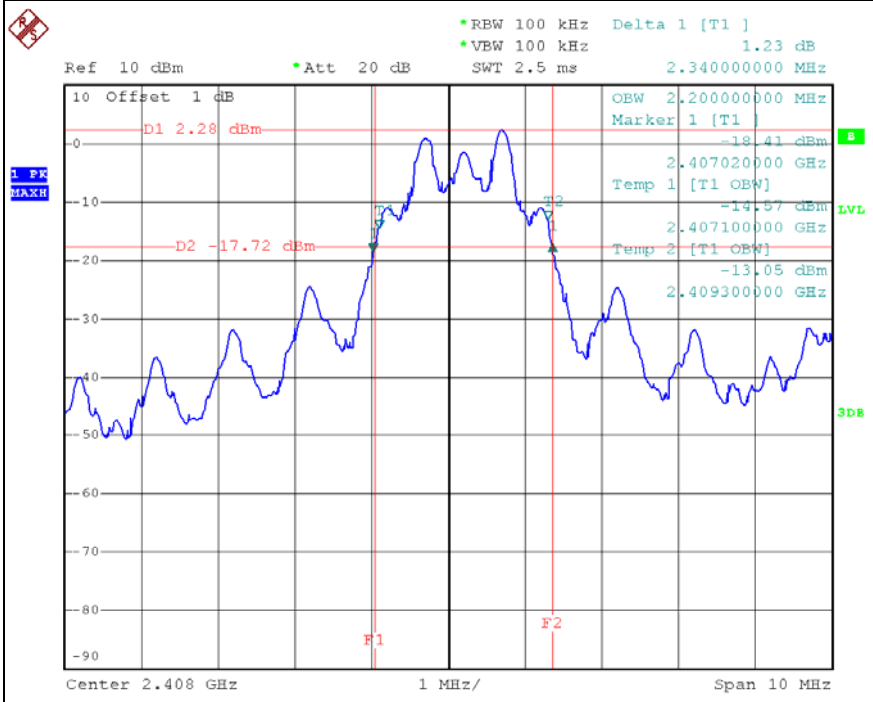
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

5.6 TEST RESULTS

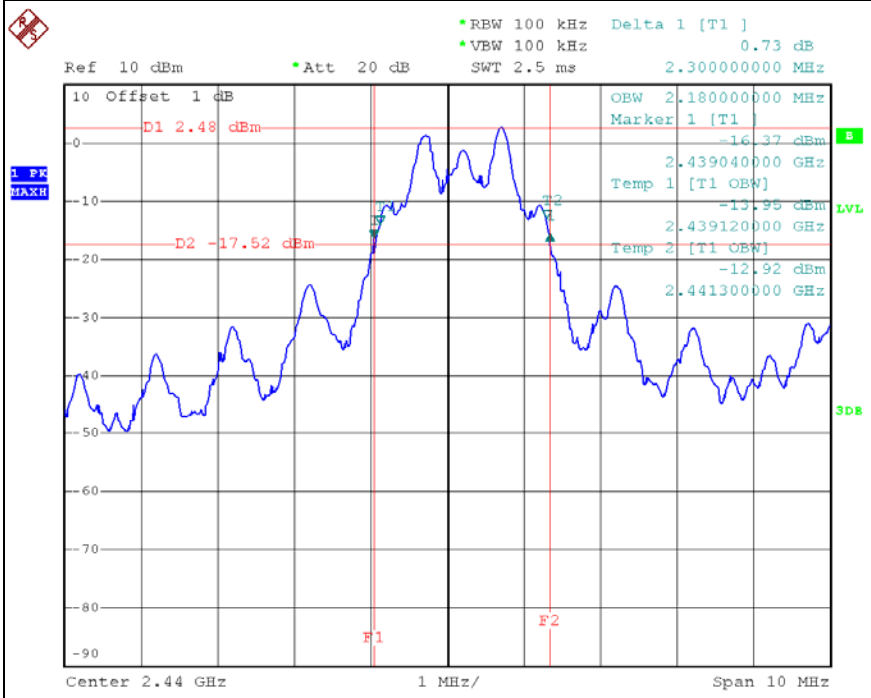
EUT	2.4GHz Nano Transceiver	Model Name	DR-9053RM
Temperature	25℃	Relative Humidity	58 %
Pressure	1009 hPa	Test Power	AC 120V/60Hz
Test Mode	TX CH 01/17/34		

Test Channel	Frequency (MHz)	20 dBc Bandwidth (MHz)
CH 01	2408	2.34
CH 17	2440	2.3
CH 34	2474	2.32

TX CH01

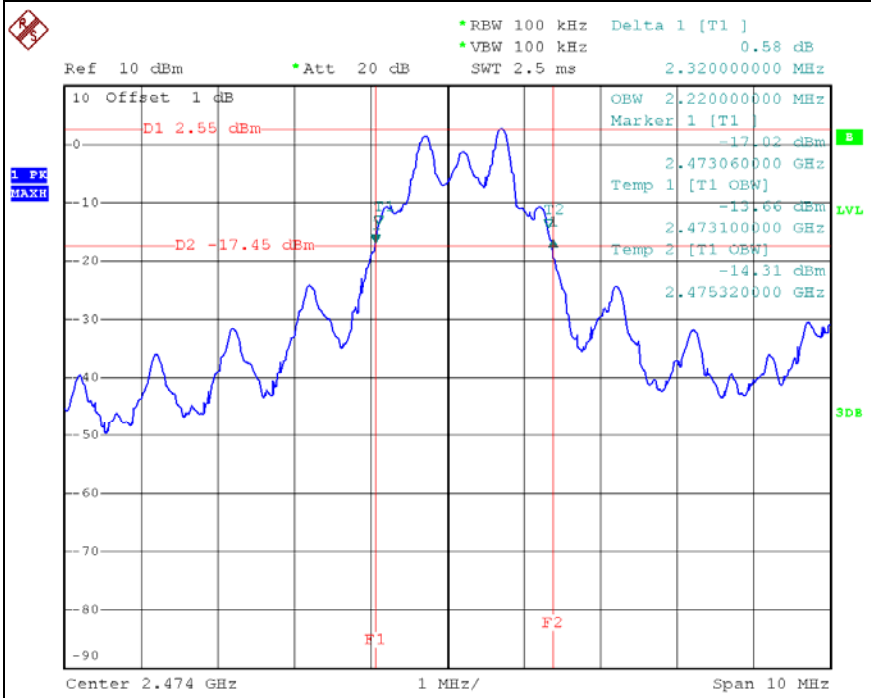


TX CH 17



Date: 18.MAR.2013 19:31:23

TX CH 34



Date: 18.MAR.2013 19:34:49

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
960~1000	500	3

6.1.1 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov.25.2013

Remark: “N/A” denotes no model name, serial no. or calibration specified.

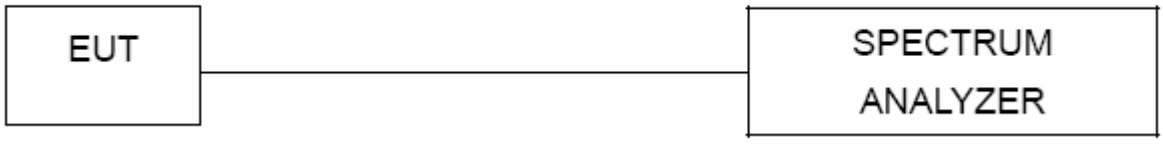
6.1.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 100KHz, VBW=100KHz, Sweep time = 10 ms.

6.1.3 DEVIATION FROM STANDARD

No deviation.

6.1.4 TEST SETUP



6.1.5 EUT OPERATION CONDITIONS

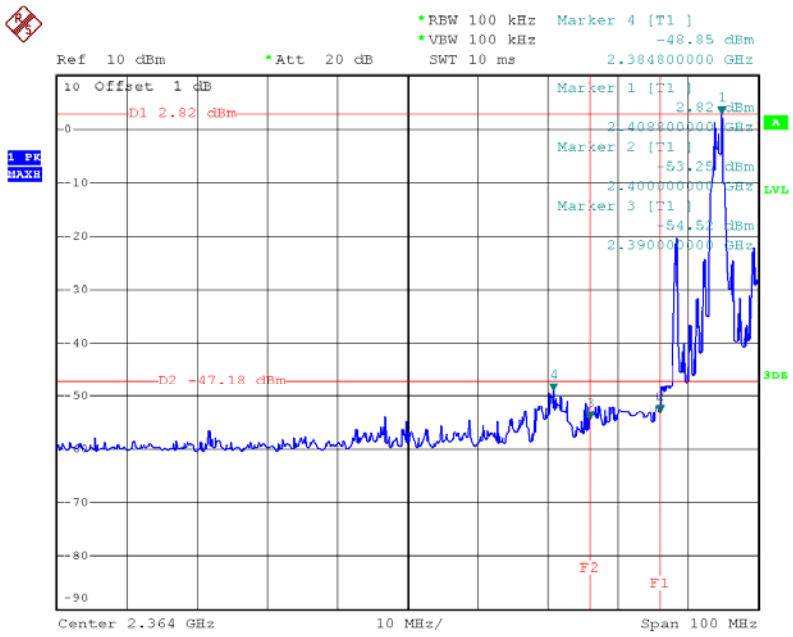
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

6.1.6 TEST RESULTS

EUT	2.4GHz Nano Transceiver	Model Name	DR-9053RM
Temperature	25℃	Relative Humidity	58 %
Pressure	1009 hPa	Test Power	AC 120V/60Hz
Test Mode	TX CH01, CH 17, CH 34		

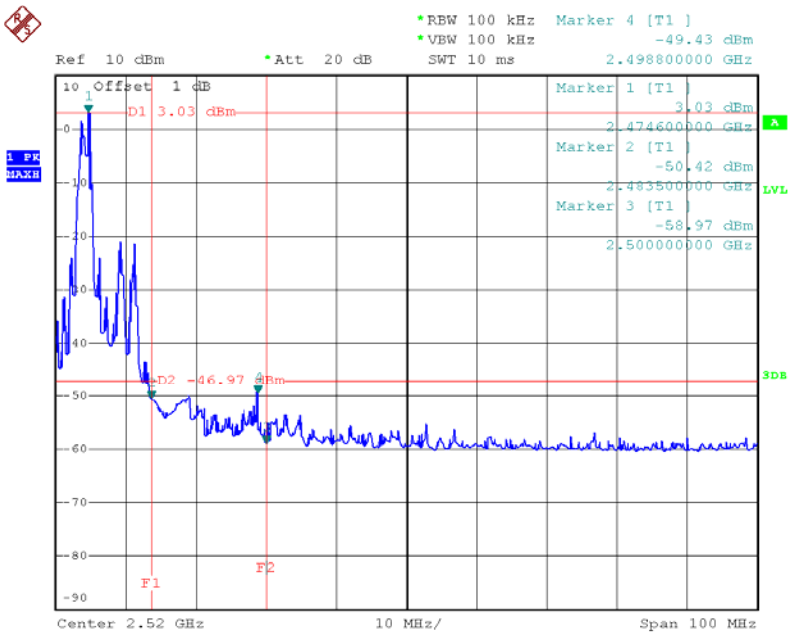
Channel of Worst Data: CH01			
The max. radio frequency power in any 100kHz bandwidth outside the frequency band		The max. radio frequency power in any 100 kHz bandwidth within the frequency band.	
FREQUENCY(MHz)	POWER(dBm)	FREQUENCY(MHz)	POWER(dBm)
2384.8	-48.85	2498.8	-49.43
Result			
Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.			

TX CH 01



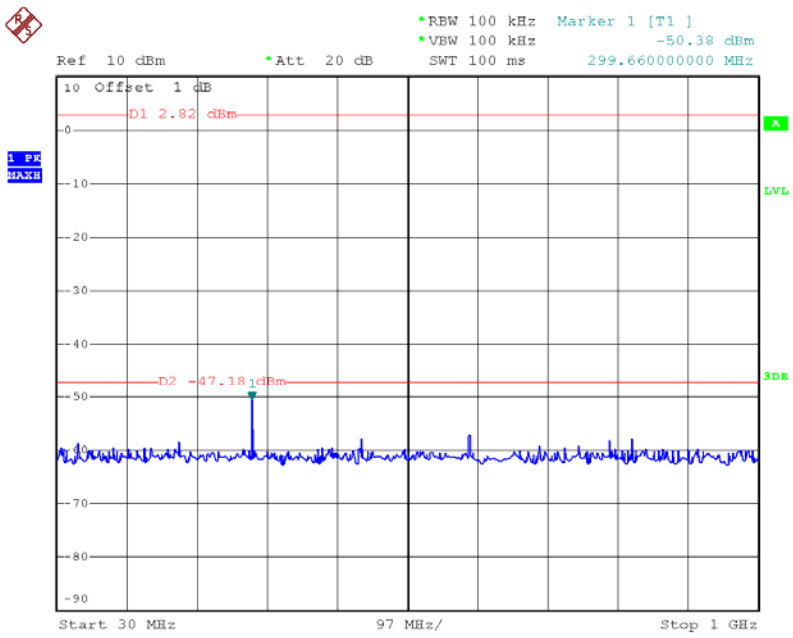
Date: 18.MAR.2013 19:26:46

TX CH 34



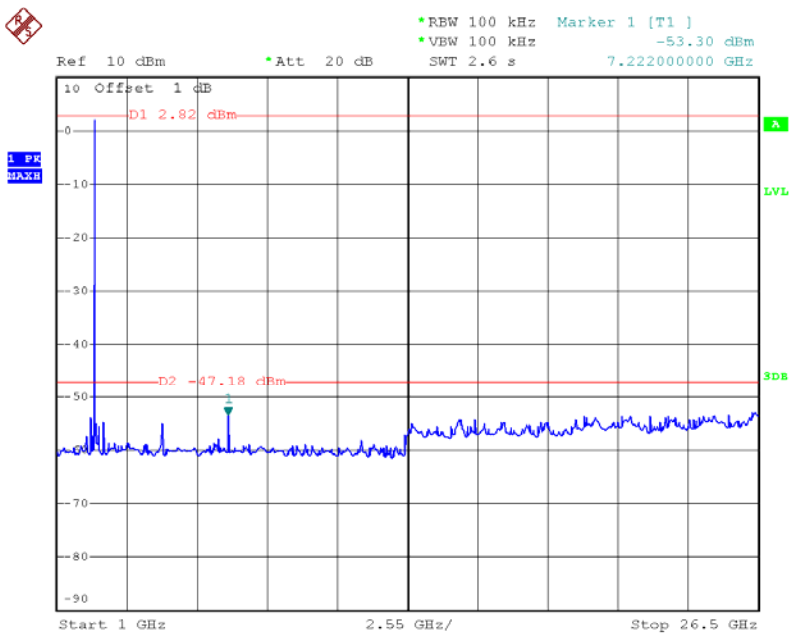
Date: 18.MAR.2013 19:36:48

TX CH 01 (30MHz~1GHz)



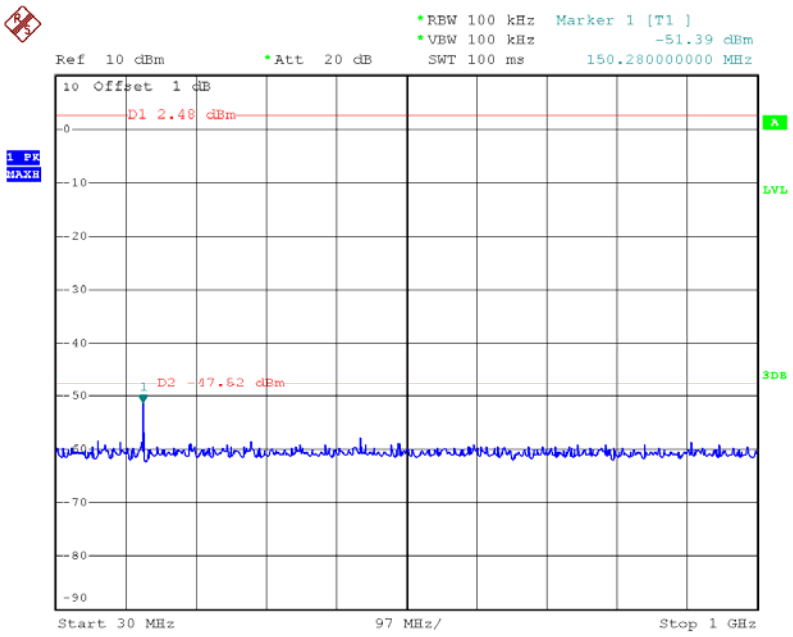
Date: 18.MAR.2013 19:27:04

TX CH 01(1GHz～10th Harmonic)



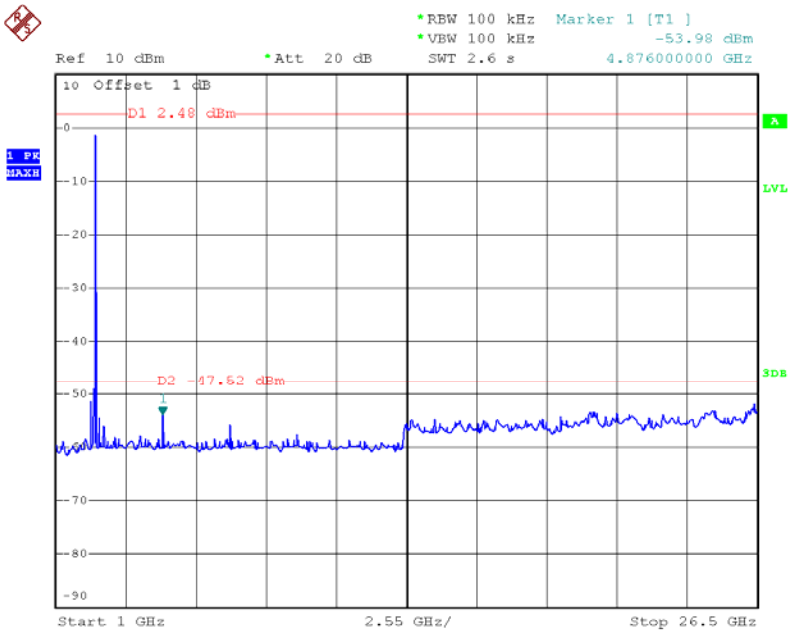
Date: 18.MAR.2013 19:27:20

TX CH 17(30MHz~1GHz)



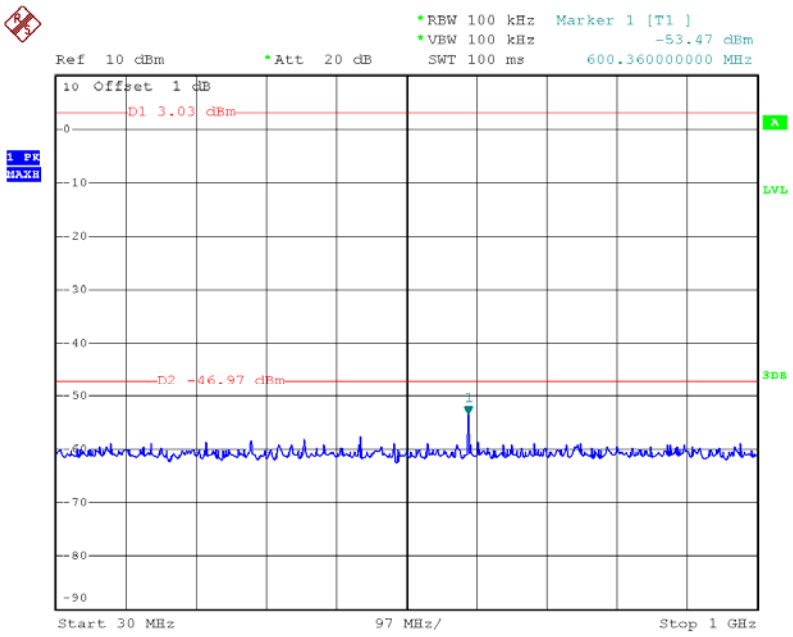
Date: 18.MAR.2013 19:31:58

TX CH 17(1GHz～10th Harmonic)



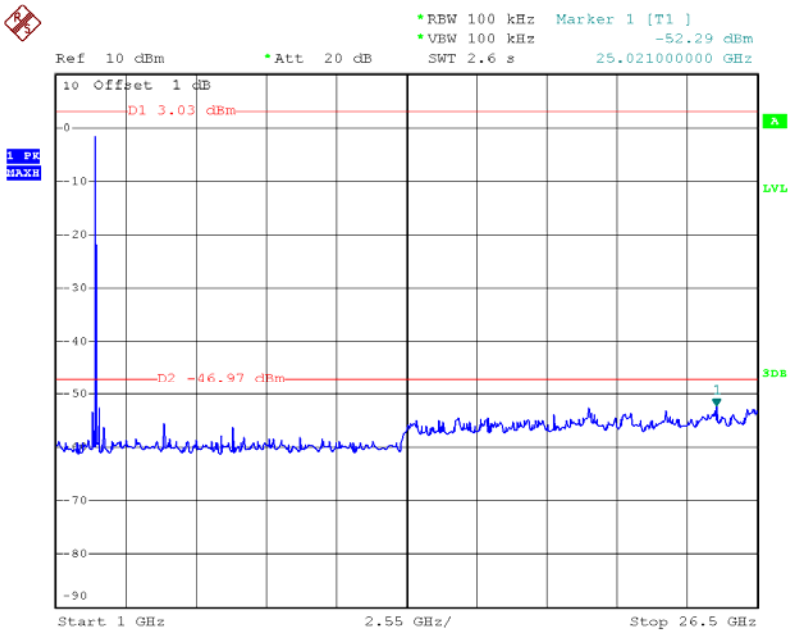
Date: 18.MAR.2013 19:32:21

TX CH 34(30MHz~1GHz)



Date: 18.MAR.2013 19:37:14

TX CH 34(1GHz～10th Harmonic)

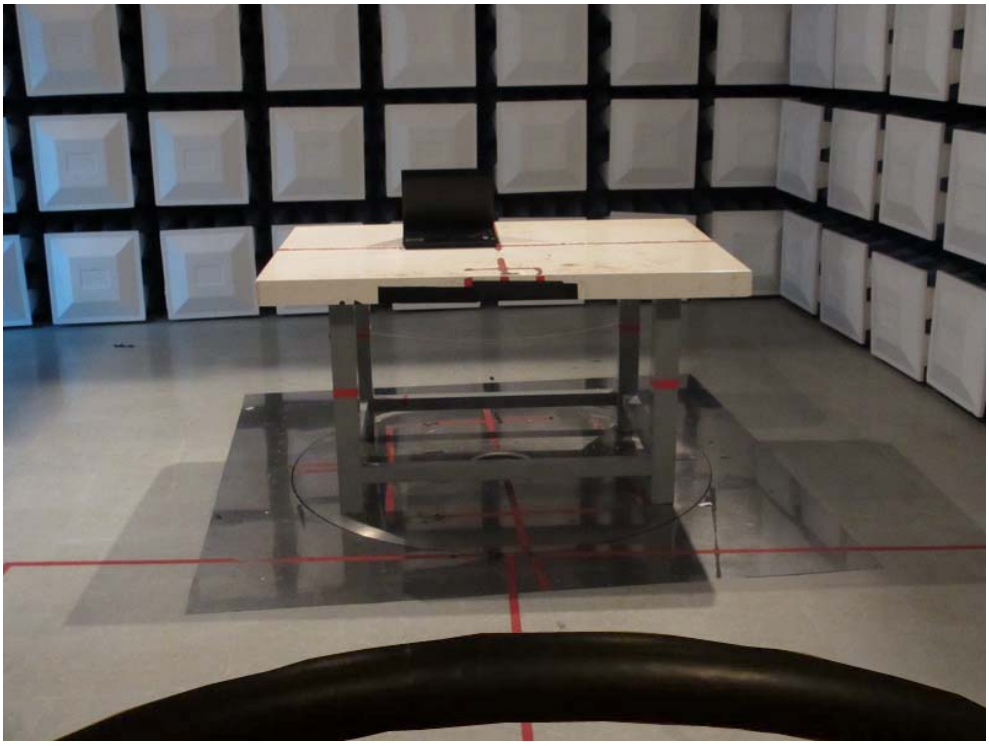


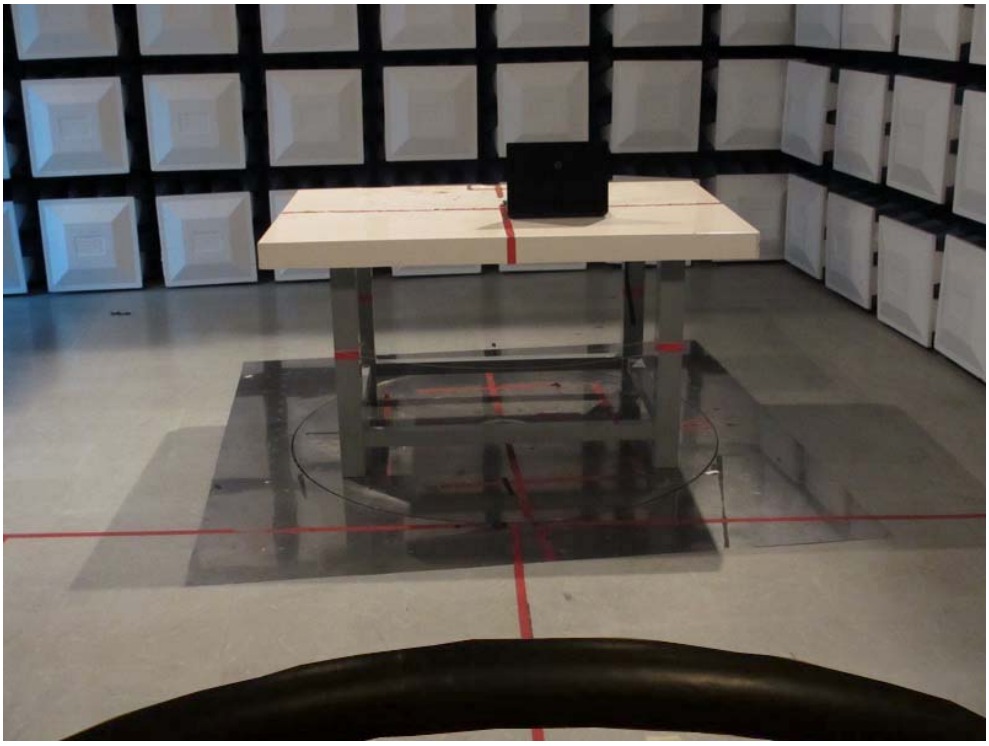
Date: 18.MAR.2013 19:37:32

7. EUT TEST PHOTO

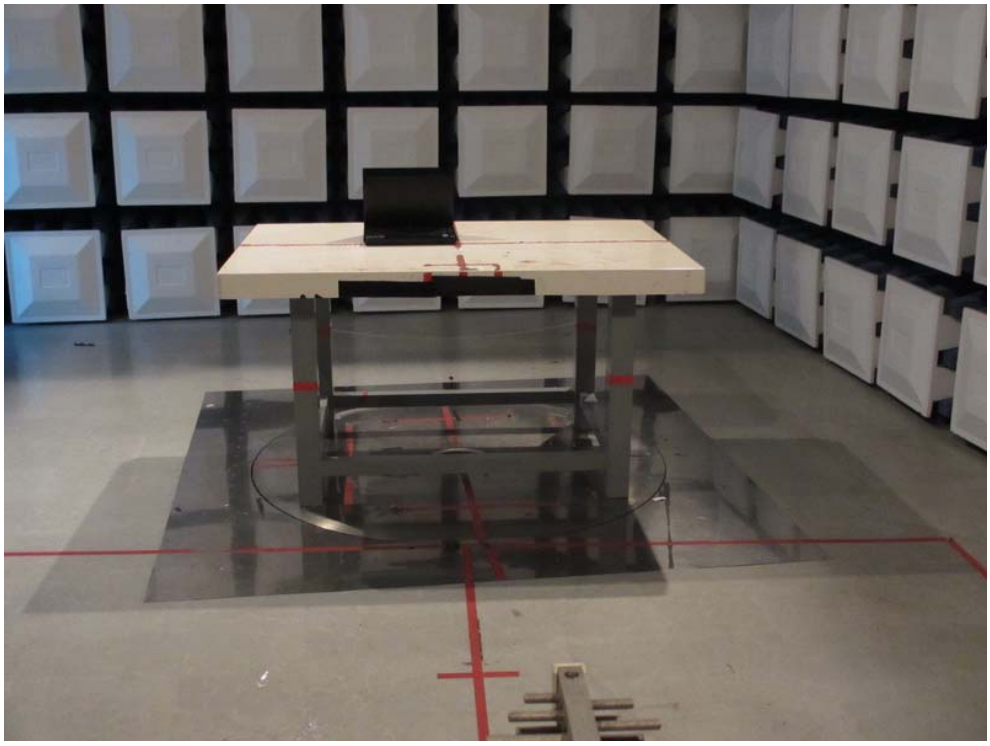
Conducted Measurement Photos

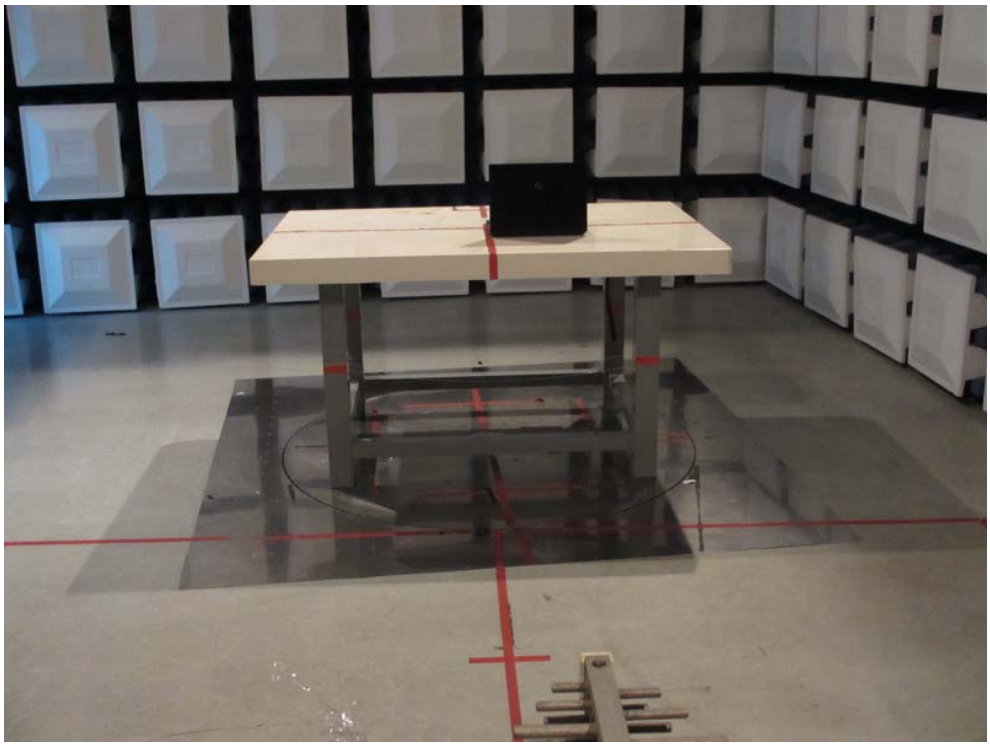
Radiated Measurement Photos
9K-30MHz





Radiated Measurement Photos
30M~1000MHz





Radiated Measurement Photos
Above 1000MHz