



Neutron Engineering Inc.

FCC&IC Radio Test Report

FCC ID: 2ACGV-MSB45X0W

IC: 12022A-MSB45X0W

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

Project No. : 1405C029A
Equipment : SOUNDAR SPEAKER
Model Name : MSB4560;
Applicant : Eastech Electronics (Hui Yang) Co. Ltd
Address : Dong Fong District, Xinxu, Hui Yang, Hui
Zhou, Guangdong

Tested by: Neutron Engineering Inc. EMC Laboratory
Date of Receipt: May. 07, 2014
Date of Test: May. 07, 2014~ May. 30, 2014
Issued Date: Jun. 03, 2014

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Testing Laboratory

2640



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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REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
NEI-FICP-1-1405C029A	Original Issue.	Jun. 03, 2014



1. CERTIFICATION

Equipment : SOUNDAR SPEAKER
Brand Name : MAGNAVOX
Model Name : MSB4560
Applicant : Eastech Electronics (Hui Yang) Co. Ltd
Manufacturer : EASTECH ELECTRONICS (H K) LTD
Address : UNIT 1703-7 17F HEWLETT CENTRE 54 HOI YUEN ROAD KOWLOON,
HONG KONG
Factory : Eastech Electronics (Hui Yang) Co. Limited
Address : Dong Feng District Xinxu, Hui Yang, Guangdong, P.R. China
Date of Test : May. 07, 2014~ May. 30, 2014
Test Sample : Engineering Sample
Standard(s) : FCC Part15, Subpart C: 2013 (15.247)/ ANSI C63.4-2009
Canada RSS-210: 2010
RSS-GEN Issue 3, Dec 2010

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-FICP-2-1405C029A) 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 standard(s):

Applied Standard(s): FCC Part15 (15.247) , Subpart C Canada RSS-210:2010; RSS-GEN Issue 3, Dec 2010				
Standard(s) Section		Test Item	Judgment	Remark
FCC	IC			
15.207	RSS-GEN 7.2.2	Conducted Emission	PASS	
15.247(d)	RSS-210 Annex 8 (A8.5)	Antenna conducted Spurious Emission	PASS	
15.247(a)(2)	RSS-210 Annex 8 (A8.2(a))	6dB Bandwidth	PASS	
15.247(b)(3)	RSS-210 Annex 8 (A8.4(4))	Peak Output Power	PASS	
15.247(e)	RSS-210 Annex 8 (A8.2(b))	Power Spectral Density	PASS	
15.203	-	Antenna Requirement	PASS	
15.209/15.205	RSS-210 Annex 8 (A8.5)	Transmitter Radiated Emissions	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 $y \pm U$, 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	9KHz~30MHz	V	3.79	
		9KHz~30MHz	H	3.57	
		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	4.15	
		18GHz~40GHz	H	4.14	



3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	SOUNDAR SPEAKER	
Brand Name	MAGNAVOX	
Model Name	MSB4560	
Product Description	Operation Frequency	2405.376~2466.816 MHz
	Modulation Technology	GFSK(1Mbps)
	Data rate	
	Output Power (Max.)	14.10dBm
Power Source	AC mains.	
Power Rating	AC 120V/60Hz	
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.

Frequency Channel			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2405.376	05	2442.240
02	2414.592	06	2451.456
03	2423.808	07	2460.672
04	2433.024	08	2466.816

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Printed	N/A	2



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	Low – TX Mode 2405.376MHz
Mode 2	Middle – TX Mode 2433.024MHz
Mode 3	High -TX Mode 2466.816MHz

For Radiated Test	
Final Test Mode	Description
Mode 1	Low – TX Mode 2405.376MHz
Mode 2	Middle – TX Mode 2433.024MHz
Mode 3	High -TX Mode 2466.816MHz

Note:

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



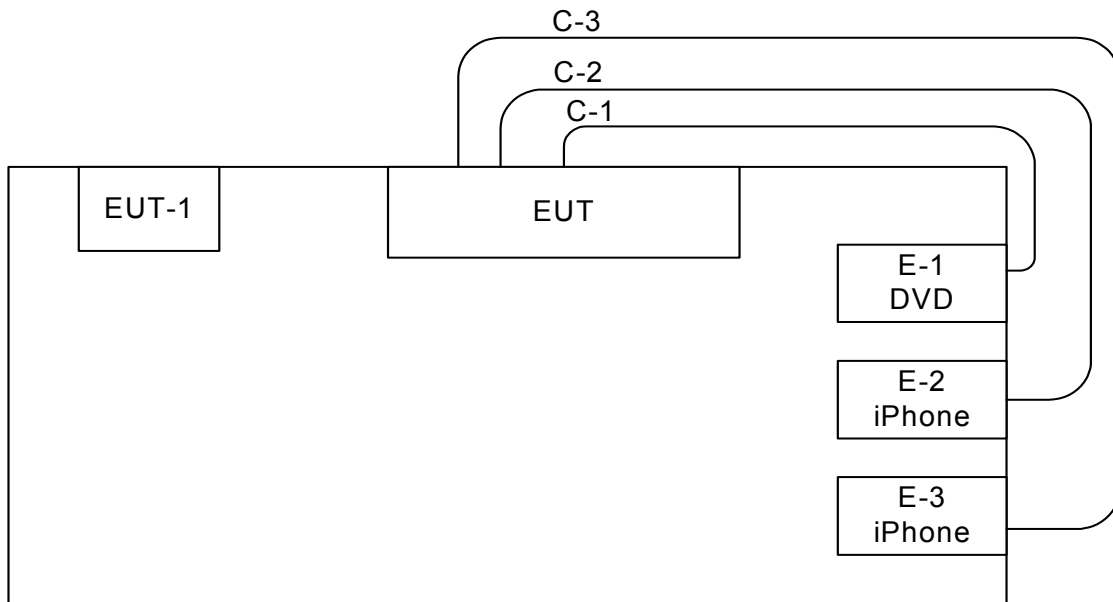
3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

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 WLAN

Test software version	N/A		
Frequency	2405.376 MHz	2433.024 MHz	2466.816MHz
-	N/A	N/A	N/A

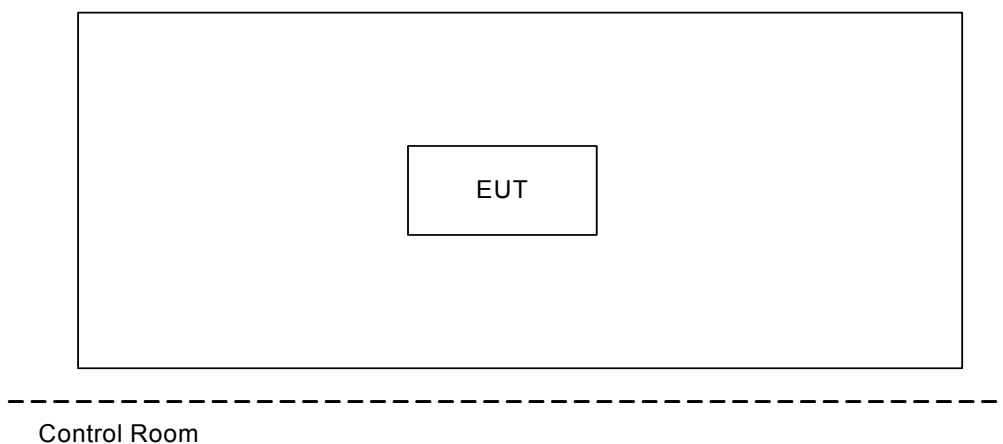
3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conducted TX Mode:



C-1 Optical Cable
C-2 Audio Cable
C-3 Audio Cable

Radiated TX Mode:





3.5 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	DVD Player	Pioneer	DV-400	DOC	GFKD000248CN	
E-2	IPHONE 4S	APPLE	A 1387	BCG-E2430A	579C-E2430A	
E-3	IPHONE 3	APPLE	A1241	BCGA1241	N/A	

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	1m	
C-2	NO	NO	1.8m	
C-3	NO	NO	1.8m	

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 (FREQUENCY RANGE 150KHZ-30MHZ)

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

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

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

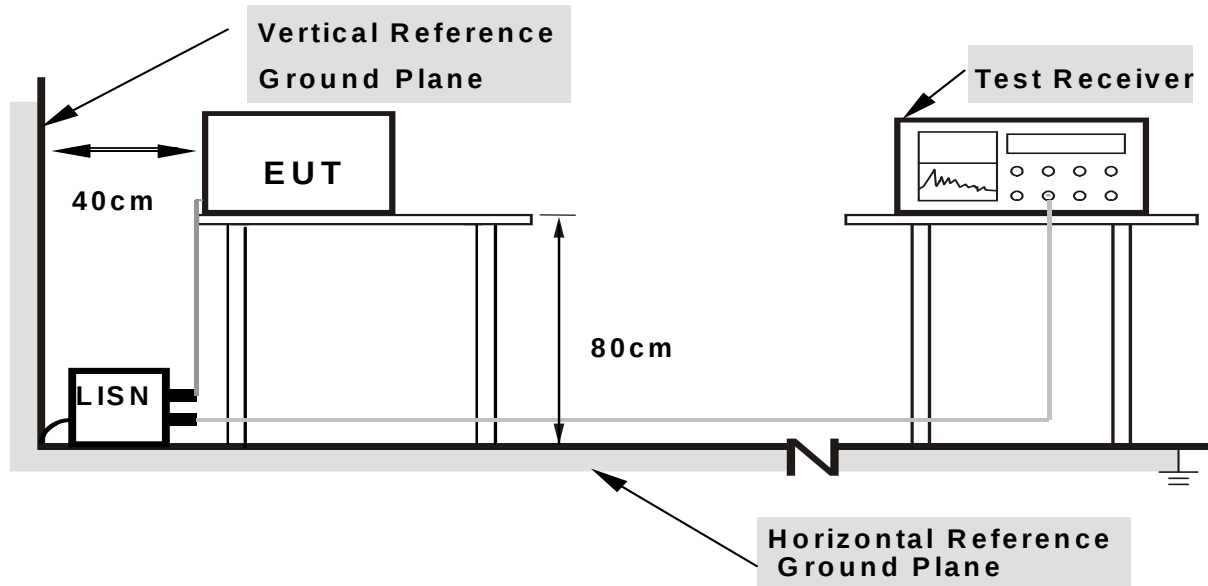
4.1.2 TEST PROCEDURE

- 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.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation

4.1.4 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

4.1.5 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.

4.1.6 EUT TEST CONDITIONS

Temperature: 25°C

Relative Humidity: 55%

Test Voltage: AC 120V/60Hz

4.1.7 TEST RESULTS

Please refer to the Attachment A.

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

20dB in any 100 KHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a) & RSS-210 section 2.2& Annex 8 (A8.5), then the 15.209(a)& RSS-Gen limit in the table below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (9KHz-1000MHz)

Frequency (MHz)	Field Strength (microvolts/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

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

Frequency (MHz)	(dBuV/m) (at 3 meters)	
	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).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average

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



4.2.2 TEST PROCEDURE

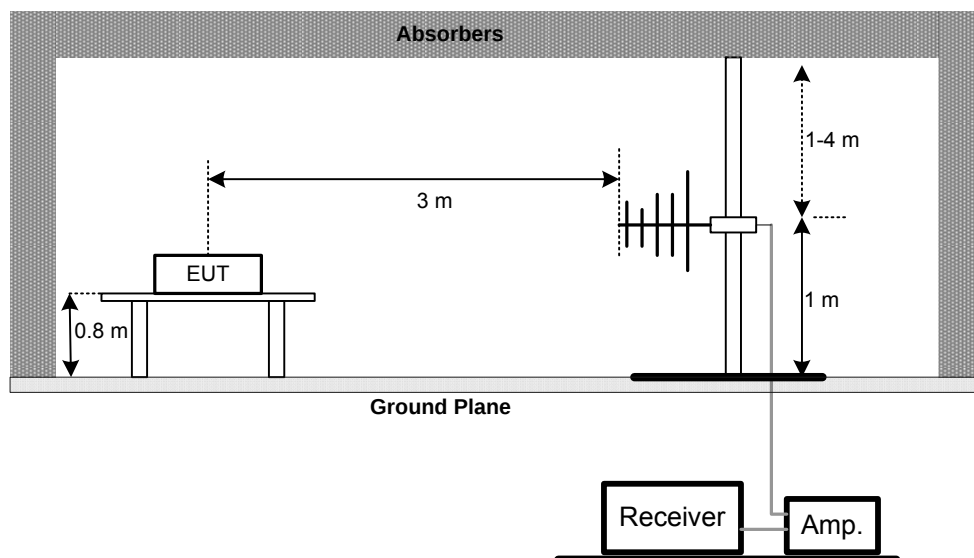
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- 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.
- 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.
- 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.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.2.3 DEVIATION FROM TEST STANDARD

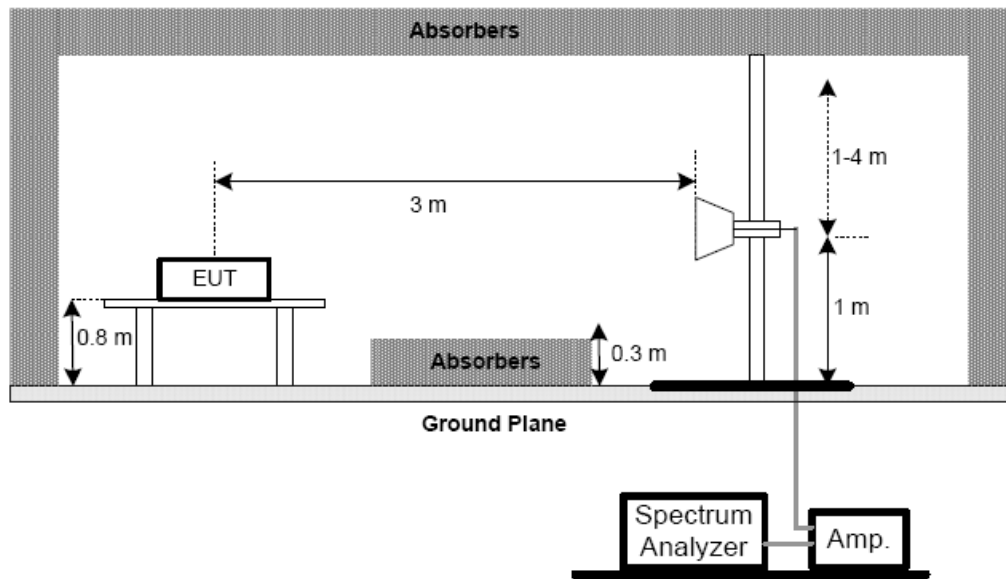
No deviation

4.2.4 TEST SETUP

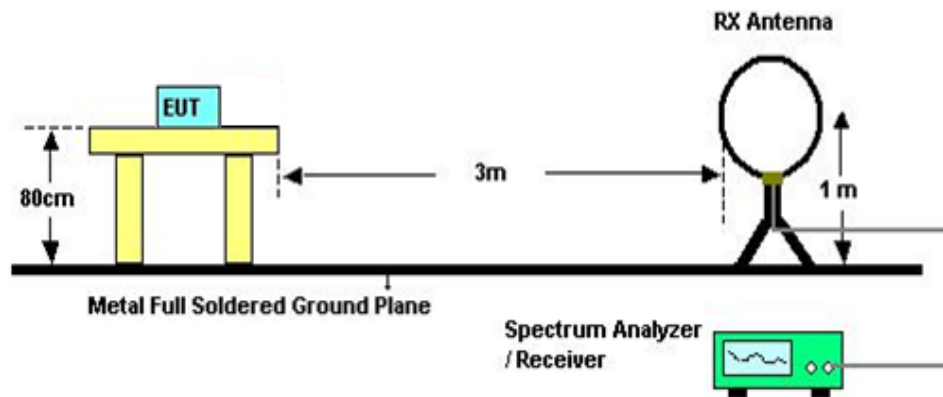
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



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



(C) For radiated emissions below 30MHz



4.2.5 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.

4.2.6 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: AC 120V/60Hz



4.2.7 TEST RESULTS (BELOW 30MHz)

Please refer to the Attachment B.

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 = $40 \log (\text{specific distance} / \text{test distance})$ (dB);.
- (3) Limit line = specific limits (dBuV) + distance extrapolation factor..

4.2.8 TEST RESULTS (BETWEEN 30 – 1000 MHz)

Please refer to the Attachment C

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 .



4.2.9 TEST RESULTS (ABOVE 1000 MHz)

Please refer to the Attachment D

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) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (5) EUT Orthogonal Axis :
“X” - denotes Laid on Table ; “Y” - denotes Vertical Stand ; “Z” - denotes Side Stand
- (6) 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
- (7) The average value of fundamental frequency is:
Average = Peak value + 20log(Duty cycle) ,Final AV=PK-19.49



5. BANDWIDTH TEST

5.1 APPLIED PROCEDURES

FCC Part15 (15.247) , Subpart C/ RSS-GEN and RSS-210			
Section	Test Item	Frequency Range (MHz)	Result
15.247(a)(2) RSS-GEN section 4.6.1 RSS-210 Annex 8 (A8.2(a))	Bandwidth	2400-2483.5	PASS

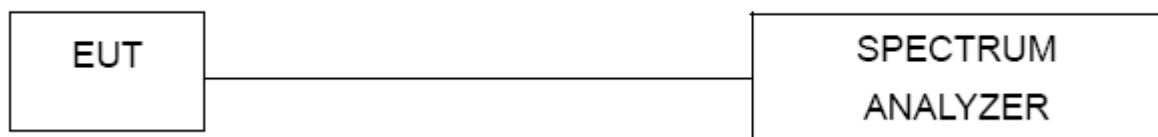
5.1.1 TEST PROCEDURE

- 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=300KHz, Sweep time = 2.5 ms.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



5.1.4 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.

5.1.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: AC 120V/60Hz

5.1.6 TEST RESULTS

Please refer to the Attachment E.



6. MAXIMUM OUTPUT POWER TEST

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C/ RSS-210				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3) RSS-210 Annex 8.4(4)	Maximum Output Power	1 Watt or 30dBm	2400-2483.5	PASS

6.1.1 TEST PROCEDURE

- The EUT was directly connected to the power meter and antenna output port as show in the block diagram below,
- The maximum peak conducted output power was performed in accordance with method 9.1.3 of FCC KDB 558074 D01 DTS Meas Guidance v03r01.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 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. Transmit output power was measured while the host equipment supply voltage was varied from 85 % to 115 % of the nominal rated supply voltage. No change in transmit output power was observed.

6.1.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: AC 120V/60Hz

6.1.6 TEST RESULTS

Please refer to the Attachment F.



7. ANTENNA CONDUCTED SPURIOUS EMISSION

7.1 APPLIED PROCEDURES / LIMIT

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

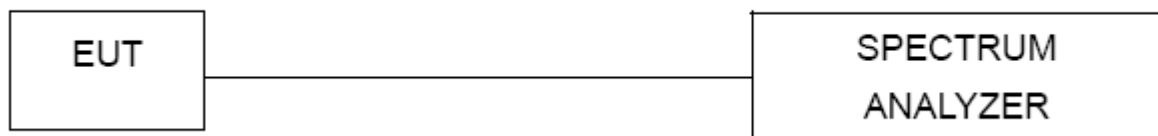
7.1.1 TEST PROCEDURE

- 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=300KHz, Sweep time = Auto.

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



7.1.4 EUT OPERATION CONDITIONS

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

7.1.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: AC 120V/60Hz

7.1.6 TEST RESULTS

Please refer to the Attachment G.



8. POWER SPECTRAL DENSITY TEST

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C / RSS-210				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(e) RSS-210 Annex 8(A8.2(b))	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

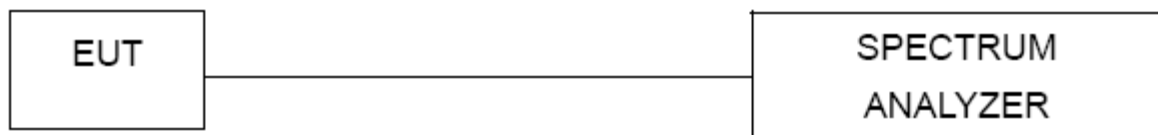
8.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting: RBW=3KHz, VBW=10KHz, Sweep time = Auto.

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



8.1.4 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.

8.1.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: AC 120V/60Hz

8.1.6 TEST RESULTS

Please refer to the Attachment H.



9. MEASUREMENT INSTRUMENTS LIST AND SETTING

Conducted Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	LISN	EMCO	3816/2	00052765	Mar. 29, 2015
2	LISN	R&S	ENV216	101447	Mar. 29, 2015
3	Test Cable	N/A	C_17	N/A	Mar. 14, 2015
4	EMI TEST RECEIVER	R&S	ESCS30	833364/017	Mar. 29, 2015
5	50Ω Terminator	SHX	TF2-3G-A	08122902	Mar. 29, 2015

Radiated Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	EMCO	3142C	00066462	Mar. 29, 2015
2	Antenna	EMCO	3142C	00066464	Mar. 29, 2015
3	Amplifier	Agilent	8447D	2944A11203	Nov. 11, 2014
4	Amplifier	Agilent	8447D	2944A11204	Nov. 11, 2014
5	Spectrum Analyzer	Agilent	E4443A	MY48250370	Nov. 11, 2014
6	RF Pre-selector	Agilent	N9039A	MY46520201	Nov. 11, 2014
7	Test Cable	N/A	Cable_5m_8m_15m	N/A	Jan. 14, 2015
8	Test Cable	N/A	Cable_5m_11m_15m	N/A	Jan. 14, 2015
9	Spectrum Analyzer	Agilent	E4447A	MY48250208	Nov. 11, 2014
10	RF Pre-selector	Agilent	N9039A	MY46520214	Nov. 11, 2014
11	Multi-Device Controller	ETS-Lindgren	2090	N/A	N/A
12	Horn Antenna	EMCO	3115	9605-4803	Mar. 29, 2015
13	Amplifier	Agilent	8449B	3008A02584	Nov. 11, 2014
14	Spectrum Analyzer	Agilent	E4447A	MY48250208	Nov. 11, 2014
15	Test Cable	Huber+Suhner	SUCOFLEX_1 5m_4m	N/A	Jan. 14, 2015



6dB Bandwidth Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 11, 2014

Peak Output Power Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	P-series Power meter	Agilent	N1911A	MY45100473	Apr. 25, 2014
2	Wireband Power sensor	Agilent	N1921A	MY51100041	Apr. 25, 2014

Antenna Conducted Spurious Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 11, 2014

Power Spectral Density Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 11, 2014

Remark: "N/A" denotes no model name, serial no. or calibration specified.
All calibration period of equipment list is one year.



10. EUT TEST PHOTO

Conducted Measurement Photos

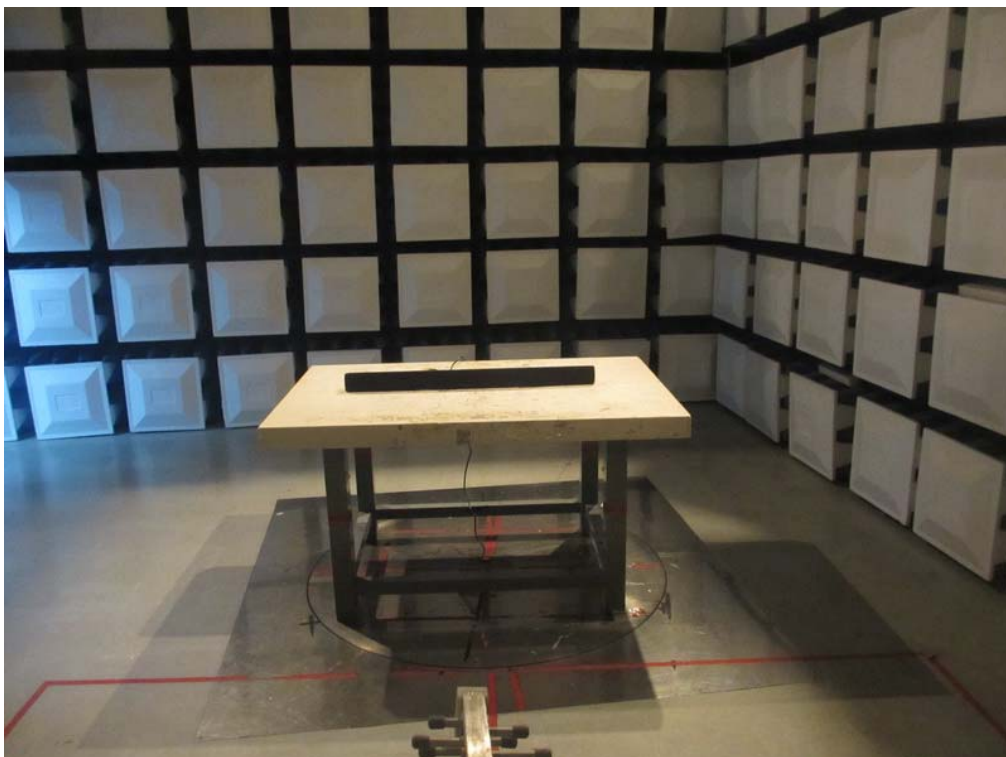
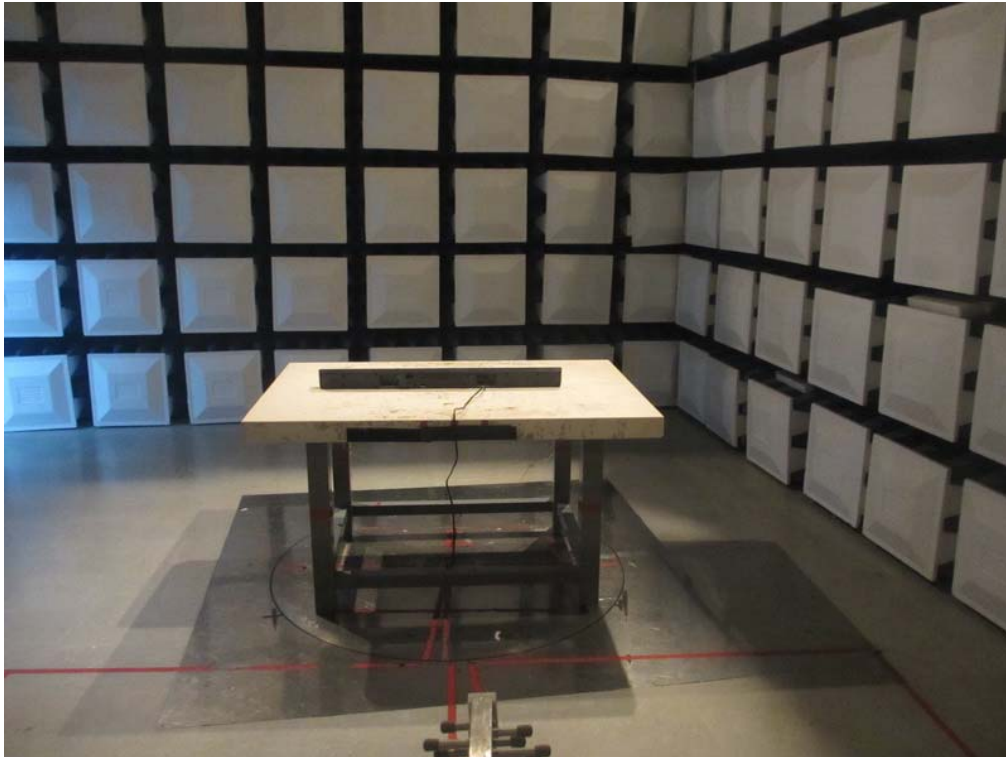


Radiated Measurement Photos



Radiated Measurement Photos

30MHz to 1000MHz



Radiated Measurement Photos

Above 1000MHz





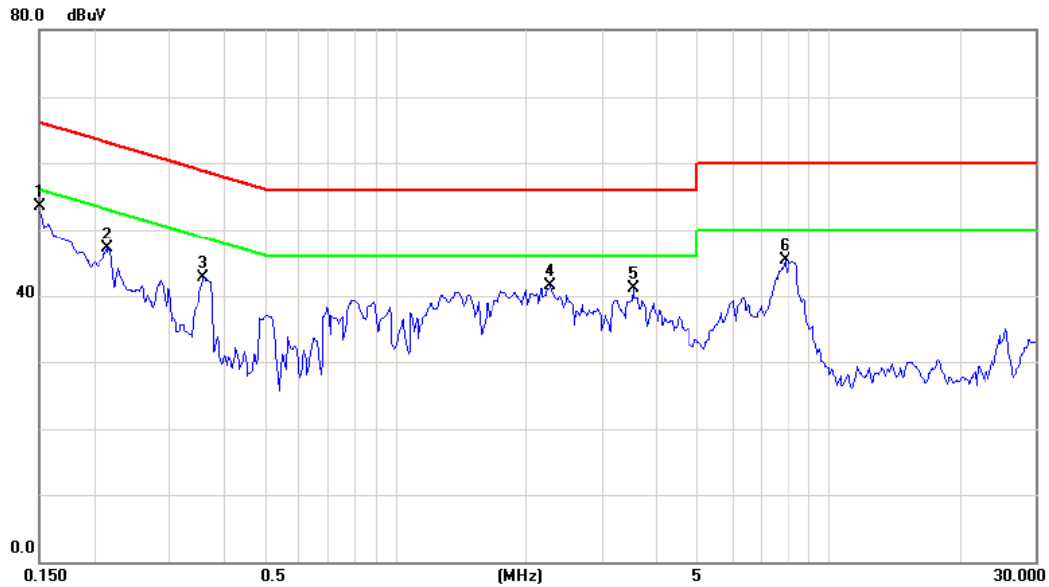
Neutron Engineering Inc.

ATTACHMENT A - CONDUCTED EMISSION



Test Mode:	TX
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Line

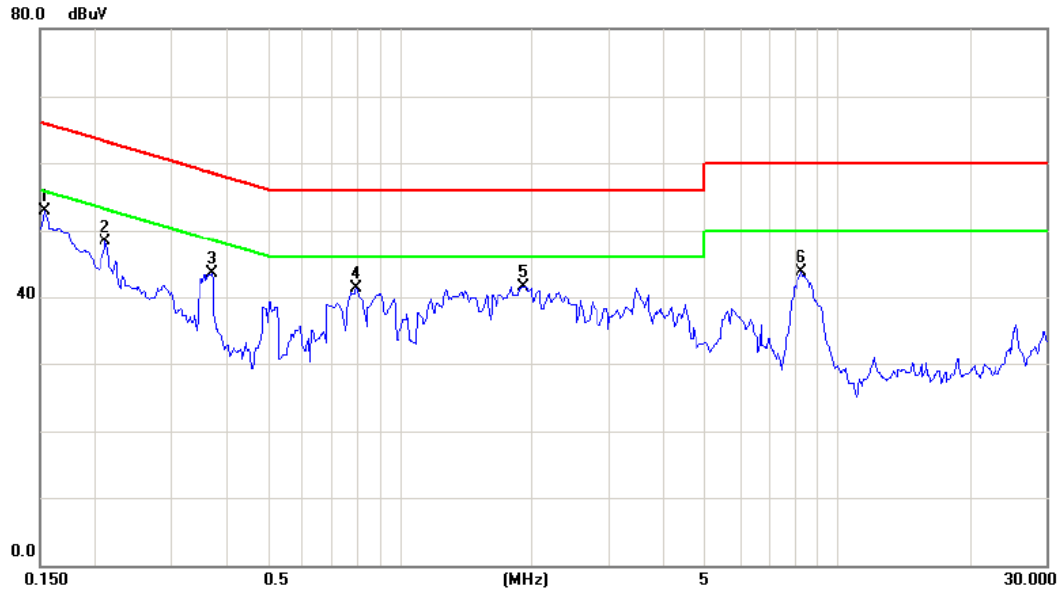


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1500	43.91	9.52	53.43	66.00	-12.57	peak	
2		0.2150	37.58	9.55	47.13	63.01	-15.88	peak	
3		0.3610	33.07	9.63	42.70	58.71	-16.01	peak	
4		2.2790	31.71	9.72	41.43	56.00	-14.57	peak	
5		3.5390	31.37	9.79	41.16	56.00	-14.84	peak	
6		7.9218	35.35	10.02	45.37	60.00	-14.63	peak	



Test Mode: TX

Neutral



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1540	43.19	9.63	52.82	65.78	-12.96	peak	
2		0.2124	38.60	9.61	48.21	63.11	-14.90	peak	
3		0.3724	33.85	9.63	43.48	58.45	-14.97	peak	
4		0.7943	31.56	9.67	41.23	56.00	-14.77	peak	
5		1.9193	31.86	9.73	41.59	56.00	-14.41	peak	
6		8.2734	33.73	10.02	43.75	60.00	-16.25	peak	



ATTACHMENT B - RADIATED EMISSION (9KHZ to 30MHZ)



Test Mode: TX Mode 2405.376MHz

Freq. (MHz)	Ant. 0°/90°	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
0.0094	0°	68.35	24.30	92.65	128.12	-35.47	AVG
0.0095	0°	72.35	24.30	96.65	148.12	-51.47	PEAK
0.0134	0°	70.35	24.30	94.65	125.06	-30.41	AVG
0.0137	0°	79.35	24.30	103.65	145.06	-41.41	PEAK
0.0242	0°	56.36	24.03	80.39	119.93	-39.53	AVG
0.0245	0°	60.12	24.03	84.15	139.93	-55.77	PEAK
0.0325	0°	61.36	23.51	84.87	117.37	-32.50	AVG
0.0328	0°	65.38	23.51	88.89	137.37	-48.48	PEAK
0.5670	0°	18.72	20.01	38.73	72.53	-33.80	QP
1.7536	0°	18.95	19.52	38.47	69.54	-31.07	QP

Freq. (MHz)	Ant. 0°/90°	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
0.00935	90°	76.35	24.30	100.65	128.19	-27.54	AVG
0.00937	90°	82.36	24.30	106.66	148.19	-41.53	PEAK
0.0236	90°	56.38	24.07	80.45	120.15	-39.69	AVG
0.0238	90°	59.35	24.07	83.42	140.15	-56.72	PEAK
0.0315	90°	57.35	23.57	80.92	117.64	-36.72	AVG
0.0318	90°	58.35	23.57	81.92	137.64	-55.72	PEAK
0.0426	90°	59.35	22.87	82.22	115.02	-32.80	AVG
0.0429	90°	63.35	22.87	86.22	135.02	-48.80	PEAK
0.4915	90°	17.45	19.82	37.27	73.77	-36.50	QP
1.7156	90°	18.63	19.53	38.16	69.54	-31.38	QP

Remark:

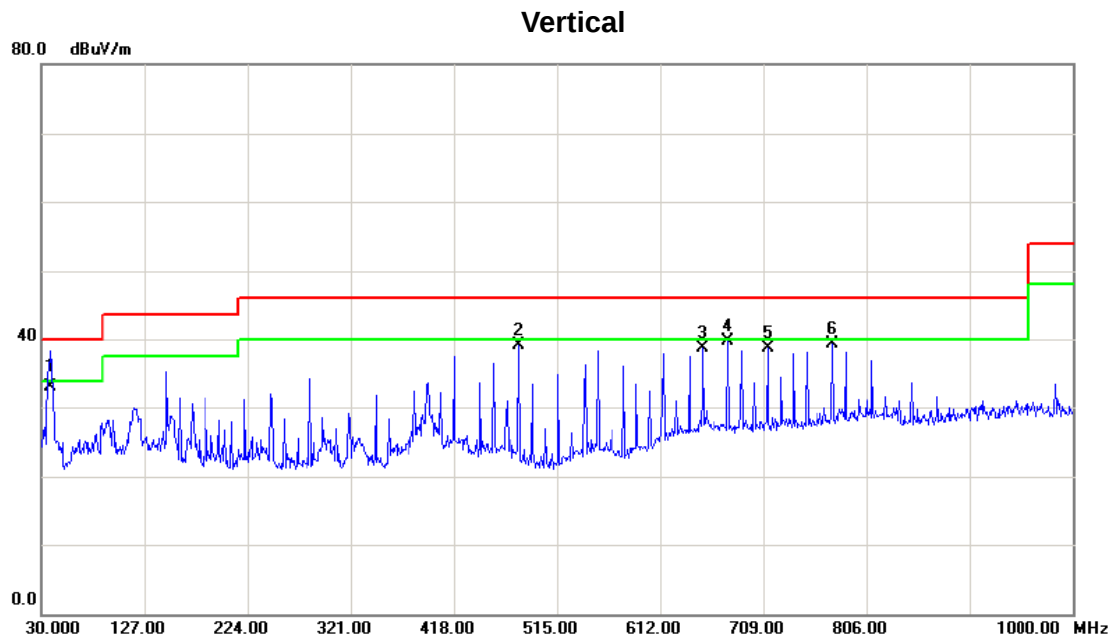
- (1) The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.
- (2) Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);
- (3) Limit line = specific limits (dBuV) + distance extrapolation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



ATTACHMENT C - RADIATED EMISSION (30MHZ TO 1000MHZ)



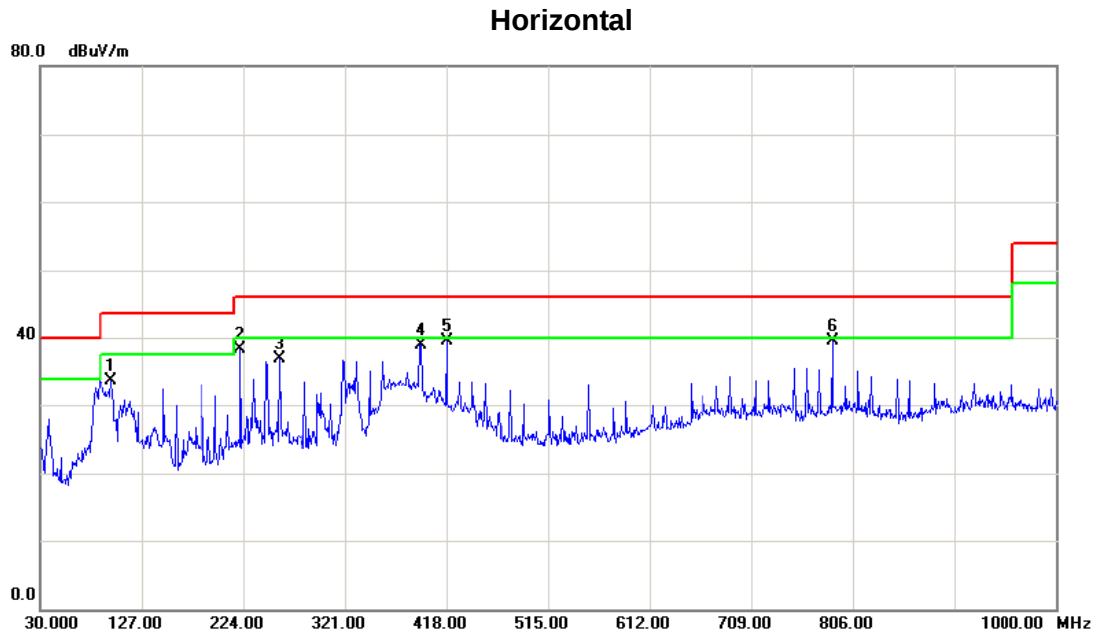
Test Mode:	TX Mode 2405.376MHz
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No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		38.7300	47.64	-14.46	33.18	40.00	-6.82	QP	
2		479.1100	48.76	-9.75	39.01	46.00	-6.99	peak	
3		651.7700	43.87	-5.19	38.68	46.00	-7.32	peak	
4	*	676.0200	44.85	-5.07	39.78	46.00	-6.22	peak	
5		712.8800	43.50	-4.88	38.62	46.00	-7.38	peak	
6		773.9900	43.17	-3.83	39.34	46.00	-6.66	peak	



Test Mode: TX Mode 2405.376MHz

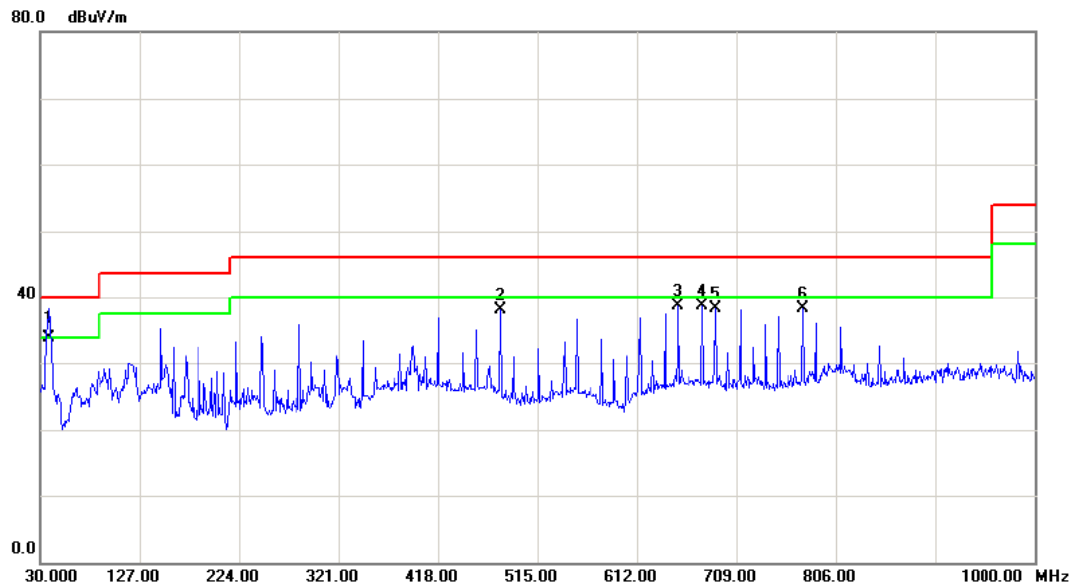


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		97.9000	50.61	-16.82	33.79	43.50	-9.71	peak	
2		221.0900	53.27	-14.89	38.38	46.00	-7.62	peak	
3		257.9500	50.83	-14.01	36.82	46.00	-9.18	peak	
4		393.7500	48.94	-9.95	38.99	46.00	-7.01	peak	
5		418.0000	48.78	-9.32	39.46	46.00	-6.54	peak	
6	*	786.6000	42.88	-3.39	39.49	46.00	-6.51	peak	



Test Mode:	TX Mode 2433.024MHz
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Vertical

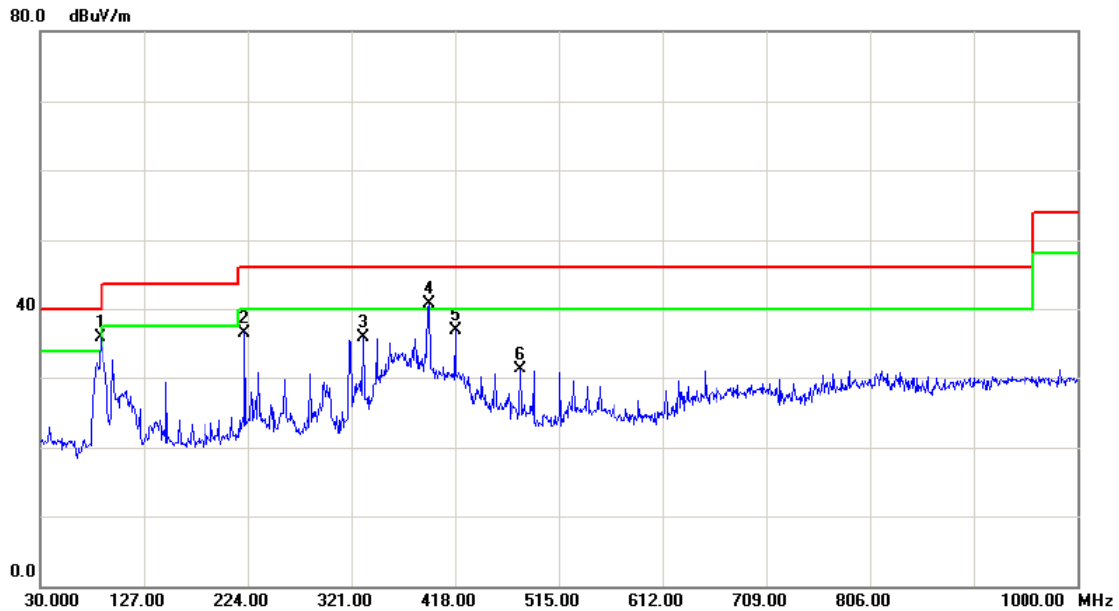


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	38.7300	48.31	-14.46	33.85	40.00	-6.15	QP	
2		479.1100	47.76	-9.75	38.01	46.00	-7.99	peak	
3		651.7700	43.87	-5.19	38.68	46.00	-7.32	peak	
4		676.0200	43.85	-5.07	38.78	46.00	-7.22	peak	
5		688.6300	43.22	-5.01	38.21	46.00	-7.79	peak	
6		773.9900	42.17	-3.83	38.34	46.00	-7.66	peak	



Test Mode: TX Mode 2433.024MHz

Horizontal

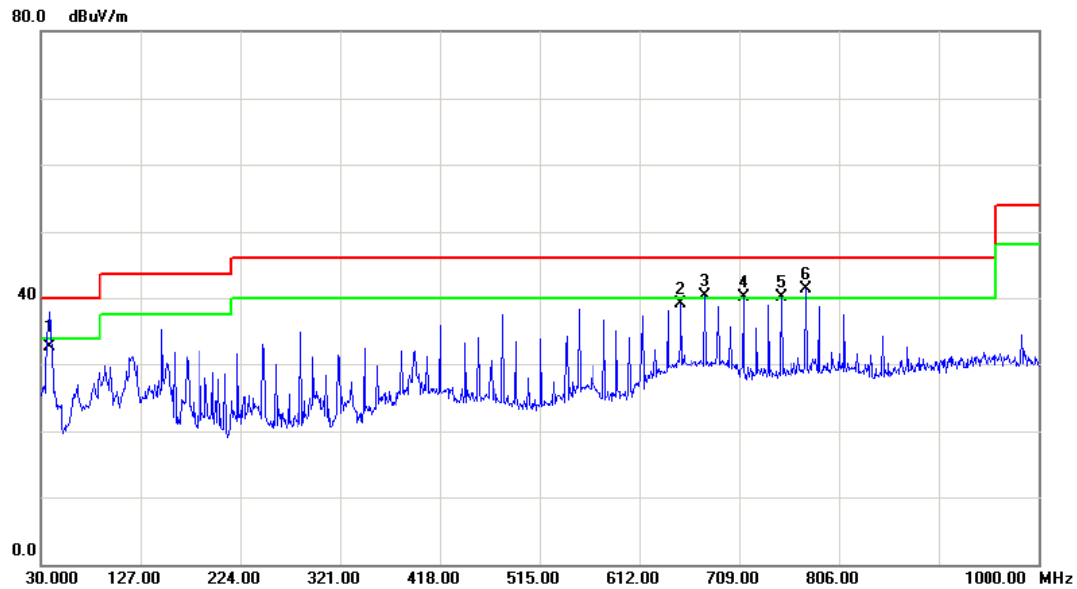


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	86.2600	53.62	-17.63	35.99	40.00	-4.01	peak	
2		221.0900	51.49	-14.89	36.60	46.00	-9.40	peak	
3		331.6700	47.37	-11.53	35.84	46.00	-10.16	peak	
4	!	393.7500	50.71	-9.95	40.76	46.00	-5.24	peak	
5		418.0000	46.14	-9.32	36.82	46.00	-9.18	peak	
6		479.1100	41.04	-9.75	31.29	46.00	-14.71	peak	



Test Mode: TX Mode 2466.816MHz

Vertical

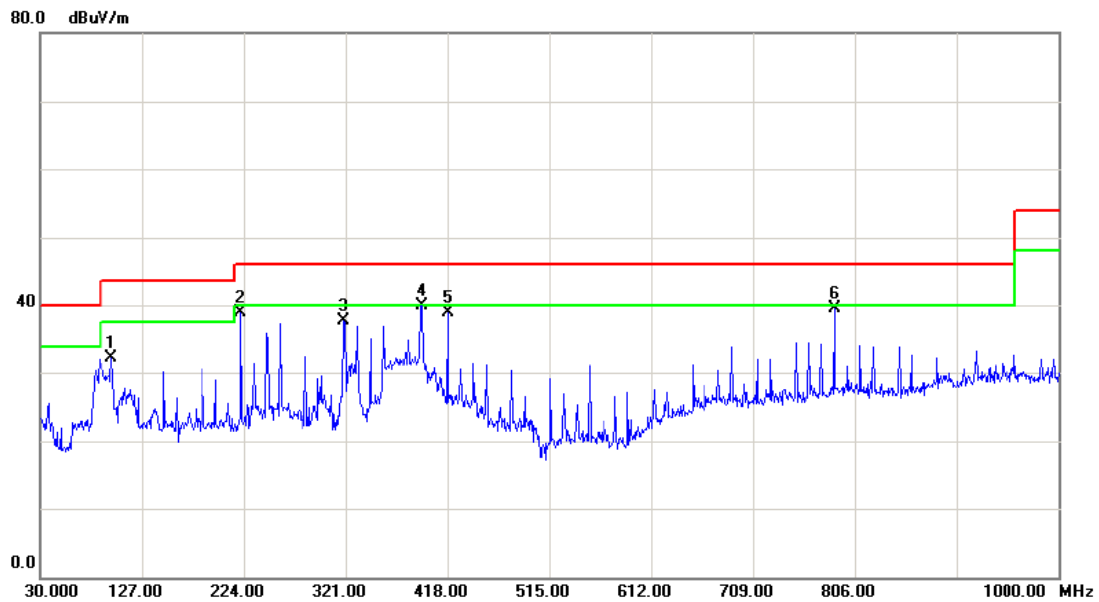


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		38.7300	47.25	-14.46	32.79	40.00	-7.21	QP	
2		651.7700	44.37	-5.19	39.18	46.00	-6.82	peak	
3	!	676.0200	45.35	-5.07	40.28	46.00	-5.72	peak	
4	!	712.8800	45.00	-4.88	40.12	46.00	-5.88	peak	
5	!	749.7400	44.71	-4.68	40.03	46.00	-5.97	peak	
6	*	773.9900	45.17	-3.83	41.34	46.00	-4.66	peak	



Test Mode:	TX Mode 2466.816MHz
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Horizontal



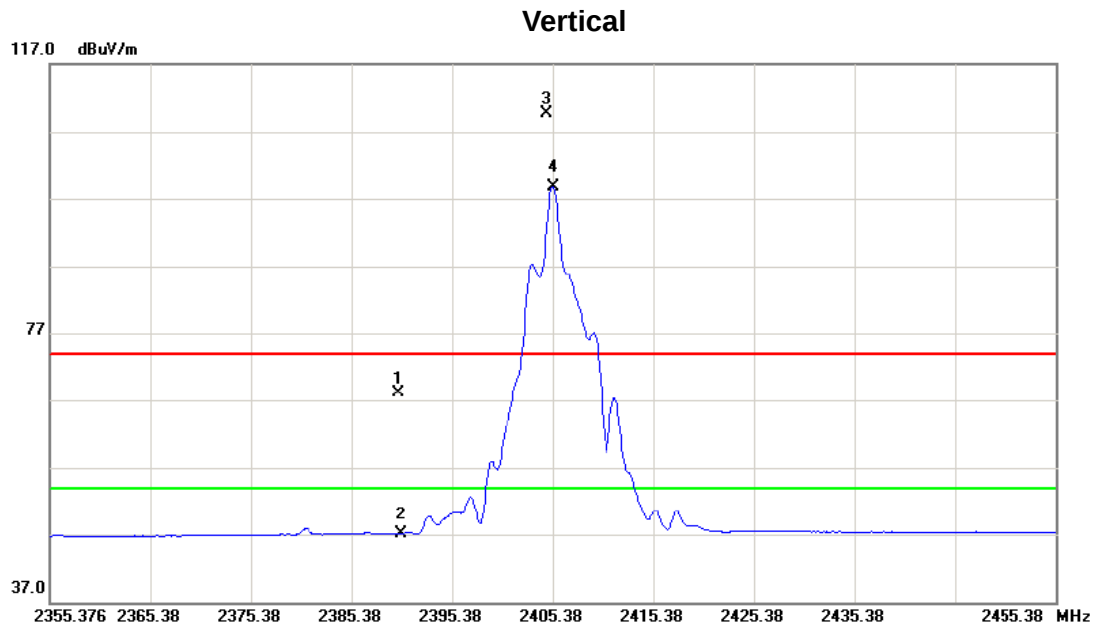
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		97.9000	49.11	-16.82	32.29	43.50	-11.21	peak	
2		221.0900	53.77	-14.89	38.88	46.00	-7.12	peak	
3		319.0600	49.05	-11.34	37.71	46.00	-8.29	peak	
4	*	393.7500	49.94	-9.95	39.99	46.00	-6.01	peak	
5		418.0000	48.28	-9.32	38.96	46.00	-7.04	peak	
6		786.6000	42.88	-3.39	39.49	46.00	-6.51	peak	



ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)



Orthogonal Axis :	X
Test Mode :	TX Mode 2405.376MHz

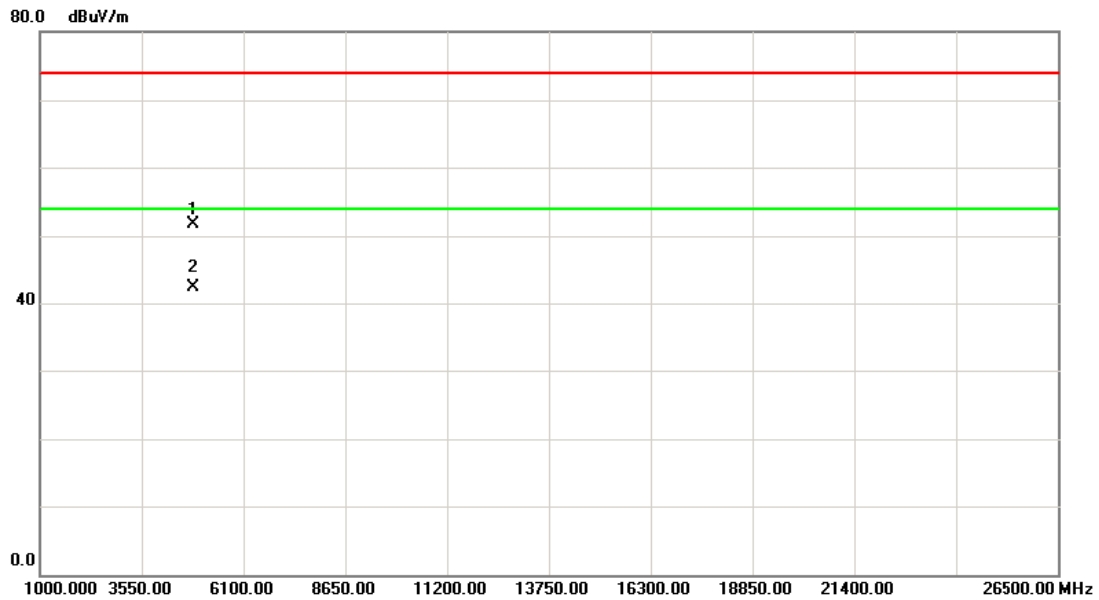


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2390.000	34.69	33.38	68.07	74.00	-5.93	peak	
2		2390.000	13.78	33.38	47.16	54.00	-6.84	AVG	
3	X	2404.776	76.25	33.42	109.67	74.00	35.67	peak	Fundamental frequency, no limit
4	*	2405.376	65.36	33.42	98.78	54.00	44.78	AVG	Fundamental frequency, no limit



Orthogonal Axis :	X
Test Mode :	TX Mode 2405.376MHz

Vertical

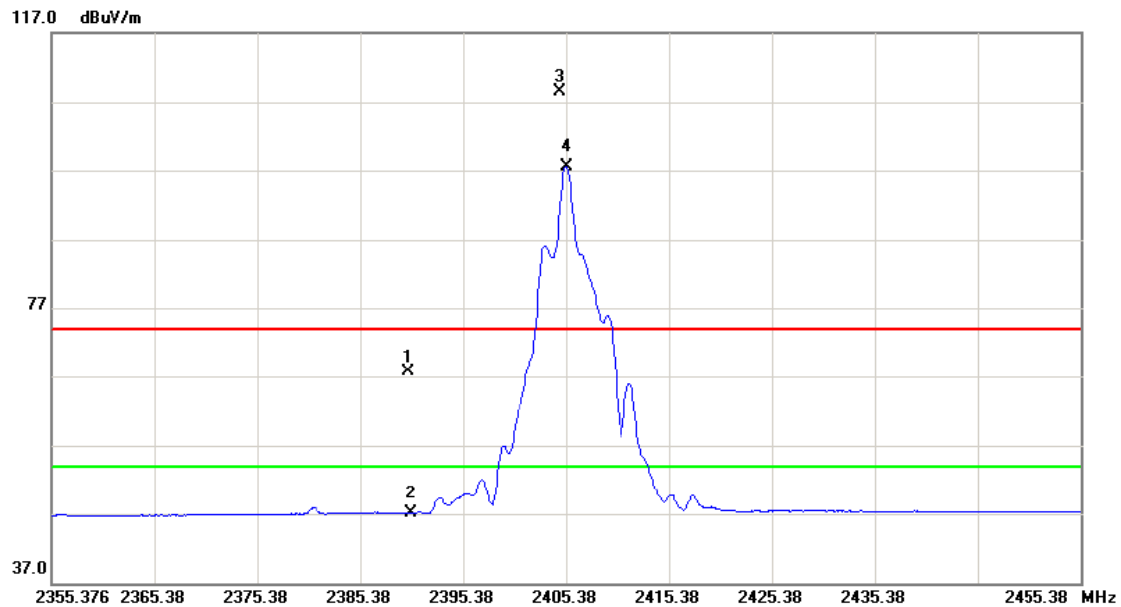


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4810.712	45.23	6.41	51.64	74.00	-22.36	peak	
2	*	4810.712	35.87	6.41	42.28	54.00	-11.72	AVG	



Orthogonal Axis :	X
Test Mode :	TX Mode 2405.376MHz

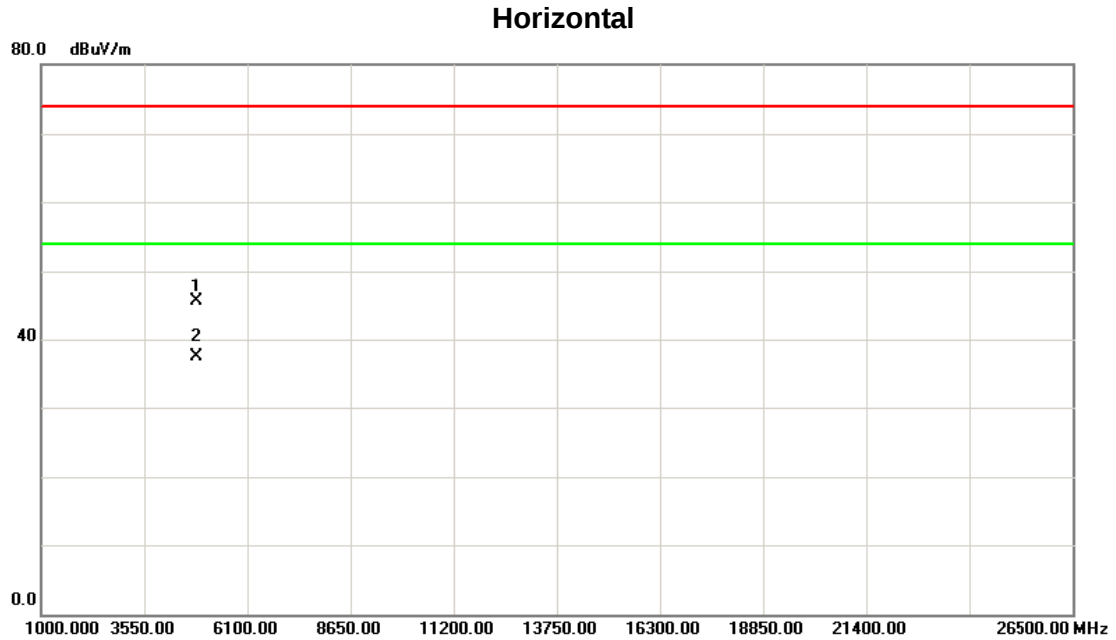
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2390.000	34.30	33.38	67.68	74.00	-6.32	peak	
2		2390.000	13.72	33.38	47.10	54.00	-6.90	AVG	
3	X	2404.776	75.10	33.42	108.52	74.00	34.52	peak	Fundamental frequency, no limit
4	*	2405.376	64.17	33.42	97.59	54.00	43.59	AVG	Fundamental frequency, no limit



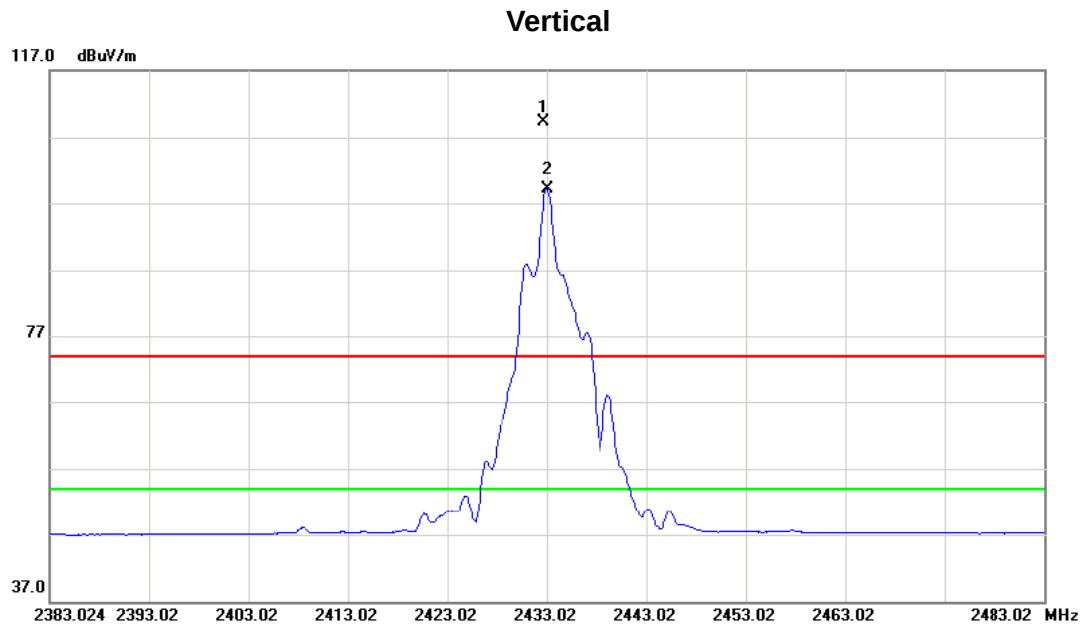
Orthogonal Axis :	X
Test Mode :	TX Mode 2405.376MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4810.712	39.14	6.41	45.55	74.00	-28.45	peak	
2	*	4810.712	31.14	6.41	37.55	54.00	-16.45	AVG	



Orthogonal Axis :	X
Test Mode :	TX Mode 2433.024MHz

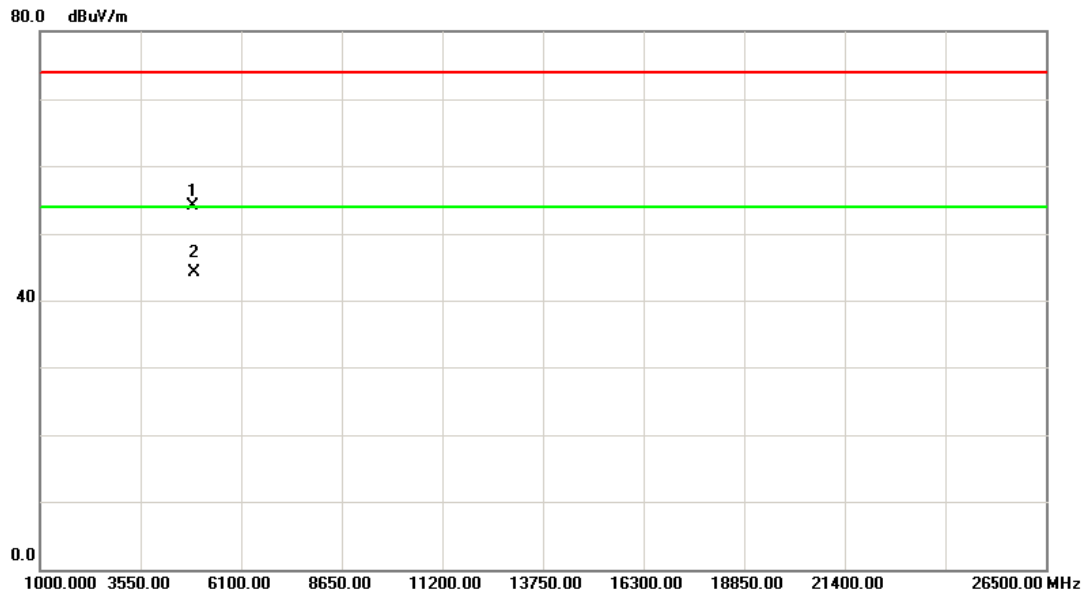


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	X	2432.624	75.75	33.49	109.24	74.00	35.24	peak	Fundamental frequency, no limit
2	*	2433.024	65.60	33.49	99.09	54.00	45.09	AVG	Fundamental frequency, no limit



Orthogonal Axis :	X
Test Mode :	TX Mode 2433.024MHz

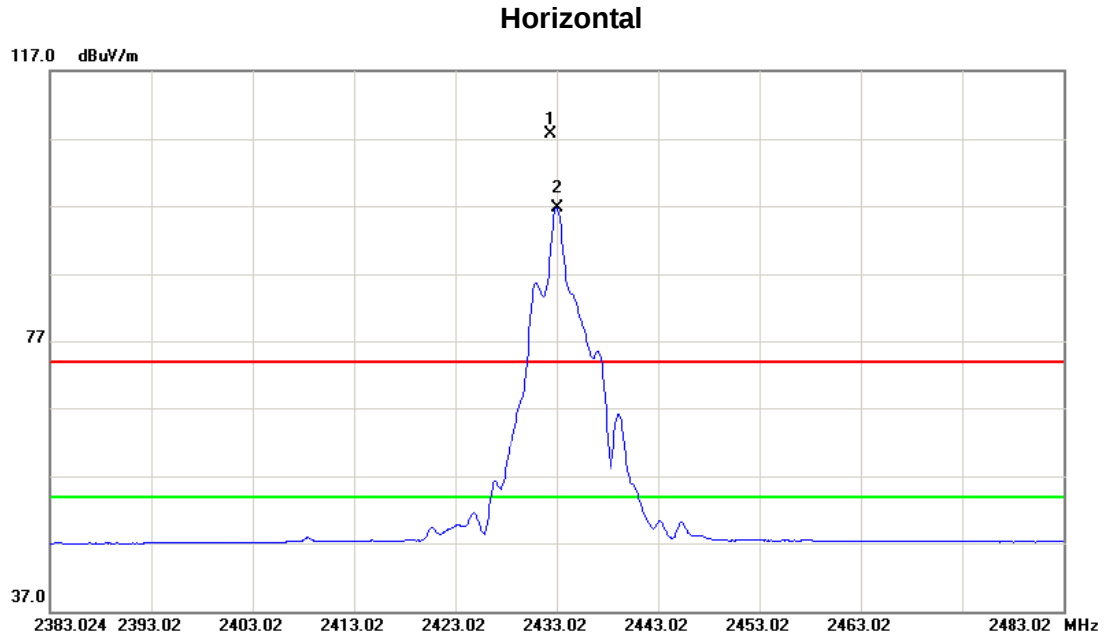
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4865.988	47.60	6.54	54.14	74.00	-19.86	peak	
2	*	4865.988	37.54	6.54	44.08	54.00	-9.92	AVG	



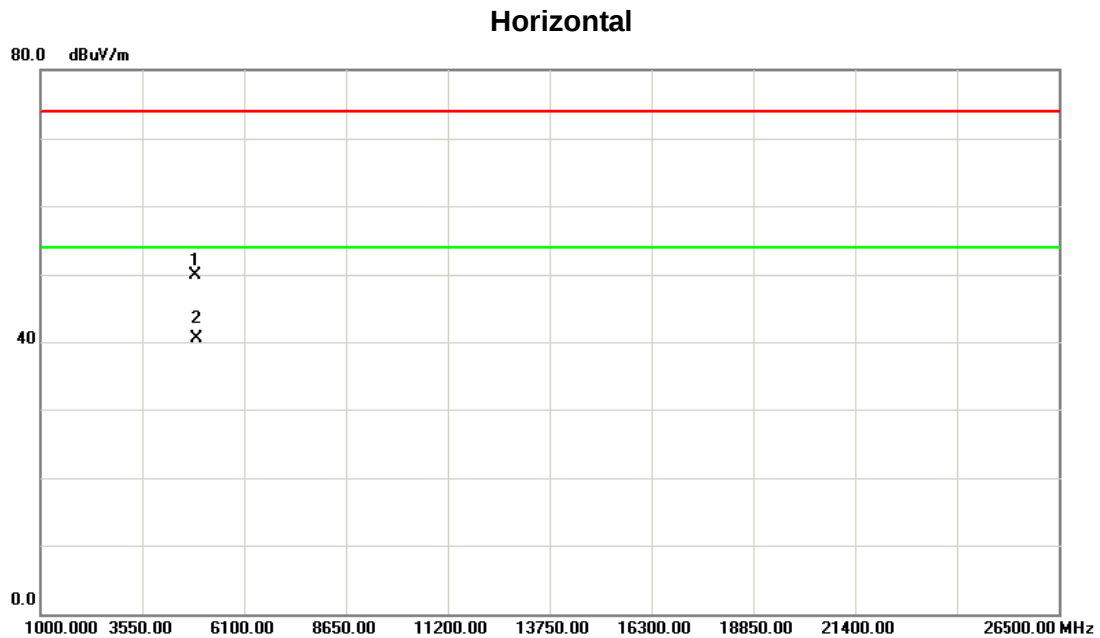
Orthogonal Axis :	X
Test Mode :	TX Mode 2433.024MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	X	2432.424	74.23	33.49	107.72	74.00	33.72	peak	Fundamental frequency, no limit
2	*	2433.024	63.14	33.49	96.63	54.00	42.63	AVG	Fundamental frequency, no limit



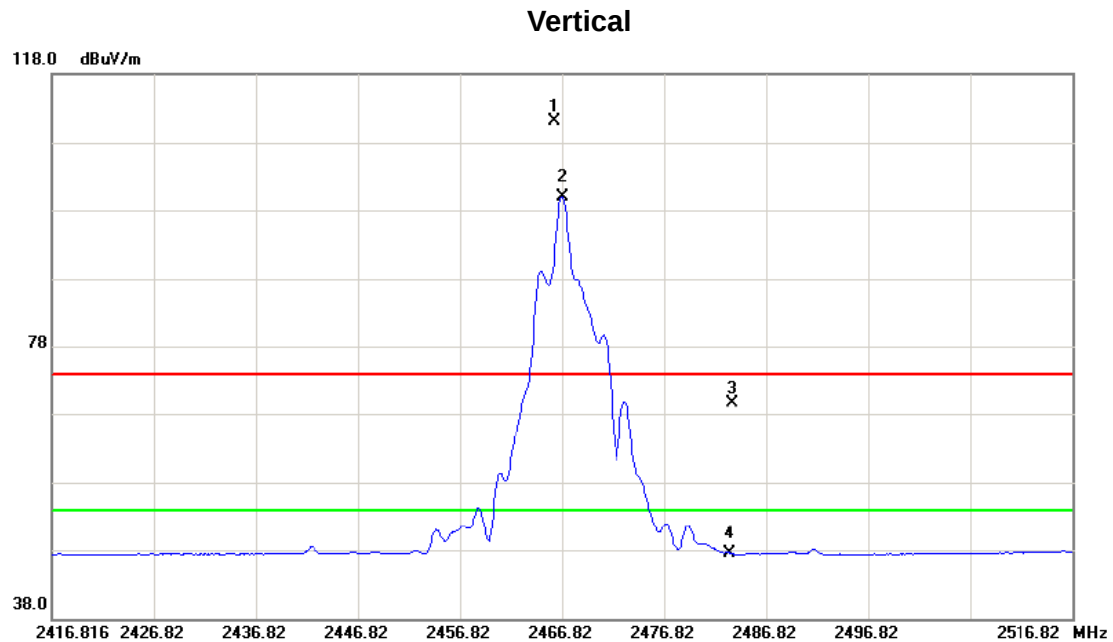
Orthogonal Axis :	X
Test Mode :	TX Mode 2433.024MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4865.988	43.45	6.54	49.99	74.00	-24.01	peak	
2	*	4865.988	33.96	6.54	40.50	54.00	-13.50	AVG	



Orthogonal Axis :	X
Test Mode :	TX Mode 2466.816MHz

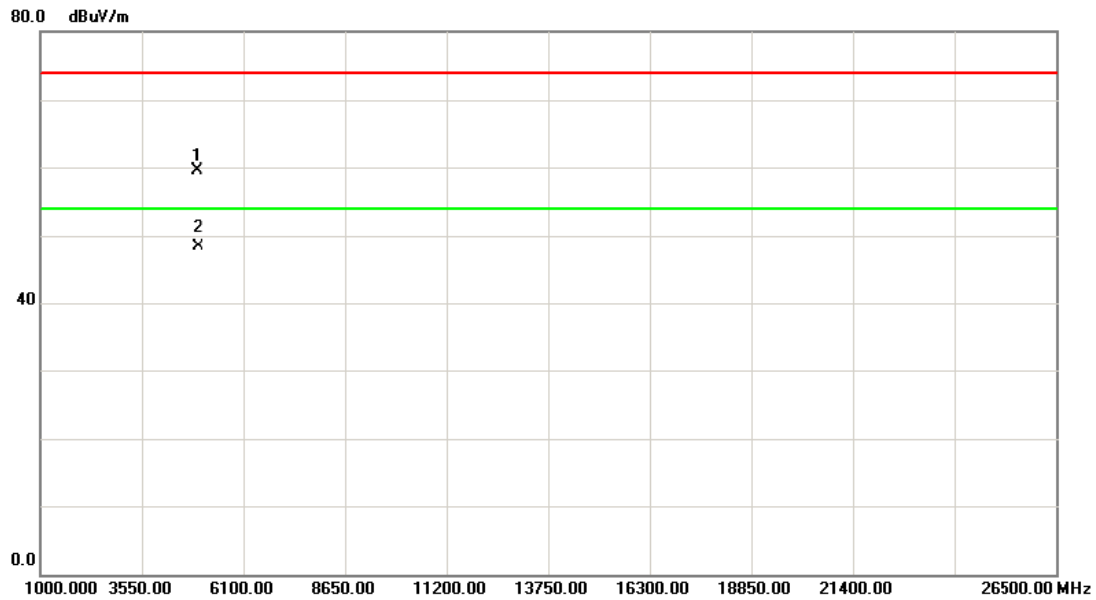


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	X	2466.116	77.50	33.57	111.07	74.00	37.07	peak	Fundamental frequency, no limit
2	*	2466.816	66.42	33.57	99.99	54.00	45.99	AVG	Fundamental frequency, no limit
3		2483.500	36.01	33.62	69.63	74.00	-4.37	peak	
4		2483.500	13.84	33.62	47.46	54.00	-6.54	AVG	



Orthogonal Axis :	X
Test Mode :	TX Mode 2466.816MHz

Vertical

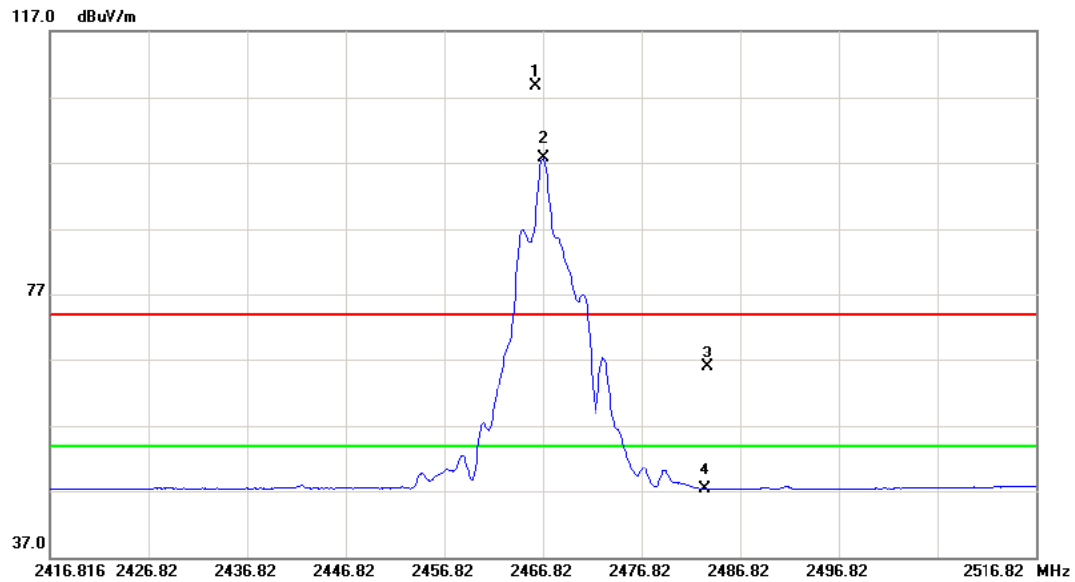


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4933.612	52.86	6.67	59.53	74.00	-14.47	peak	
2	*	4933.612	41.71	6.67	48.38	54.00	-5.62	AVG	



Orthogonal Axis :	X
Test Mode :	TX Mode 2466.816MHz

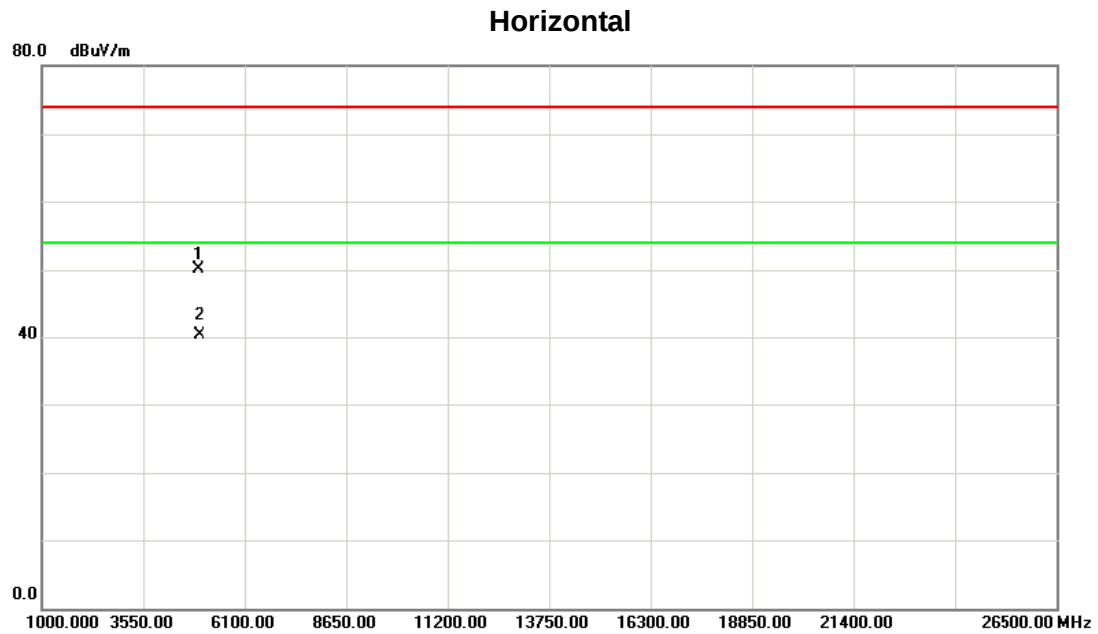
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	X	2466.116	75.15	33.57	108.72	74.00	34.72	peak	Fundamental frequency, no limit
2	*	2466.816	64.06	33.57	97.63	54.00	43.63	AVG	Fundamental frequency, no limit
3		2483.500	32.38	33.62	66.00	74.00	-8.00	peak	
4		2483.500	13.69	33.62	47.31	54.00	-6.69	AVG	



Orthogonal Axis :	X
Test Mode :	TX Mode 2466.816MHz



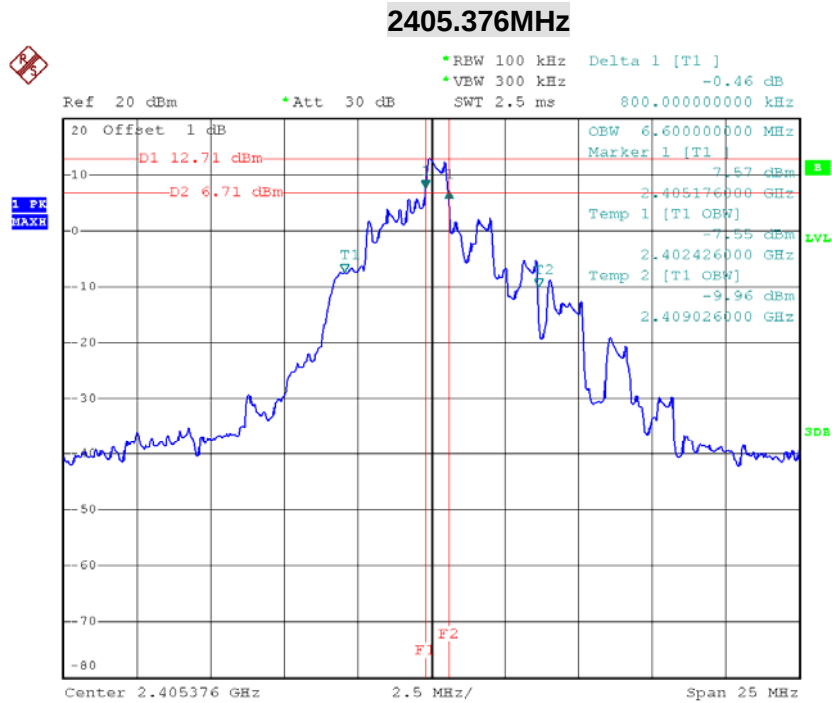
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4933.592	43.44	6.67	50.11	74.00	-23.89	peak	
2	*	4933.592	33.63	6.67	40.30	54.00	-13.70	AVG	



ATTACHMENT E - BANDWIDTH



Test Mode : TX Mode



Date: 28.MAY.2014 23:53:27



2433.024MHz



Date: 29.MAY.2014 00:11:05

2466.816MHz



Date: 29.MAY.2014 00:20:12



ATTACHMENT F - MAXIMUM OUTPUT POWER



Test Mode : TX Mode				
Test Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Limit (Watt)
CH01	2405.376	14.10	30	1
CH04	2433.024	13.33	30	1
CH08	2466.816	14.08	30	1



Neutron Engineering Inc.

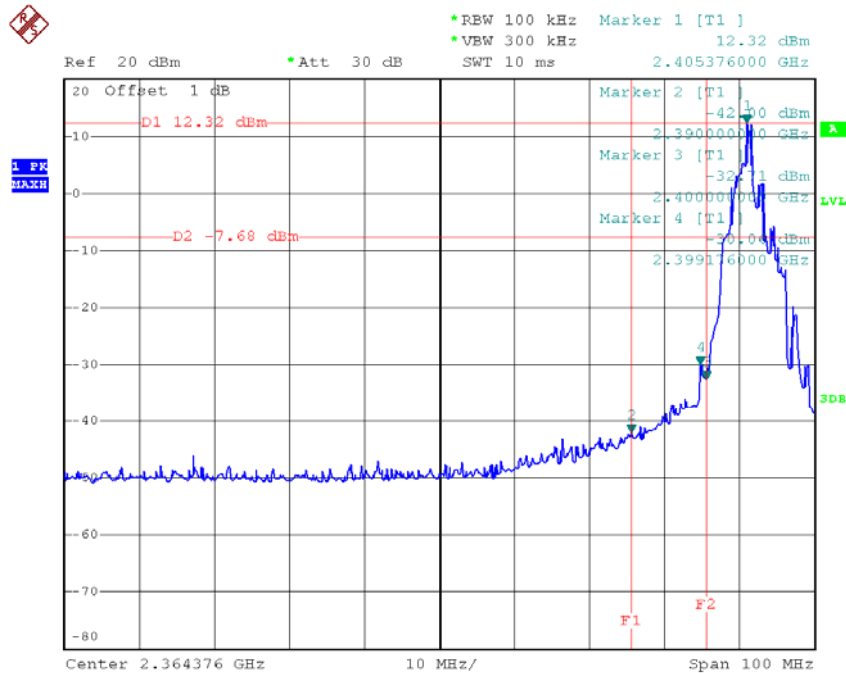
ATTACHMENT G - ANTENNA CONDUCTED SPURIOUS EMISSION



Test Mode :	TX Mode
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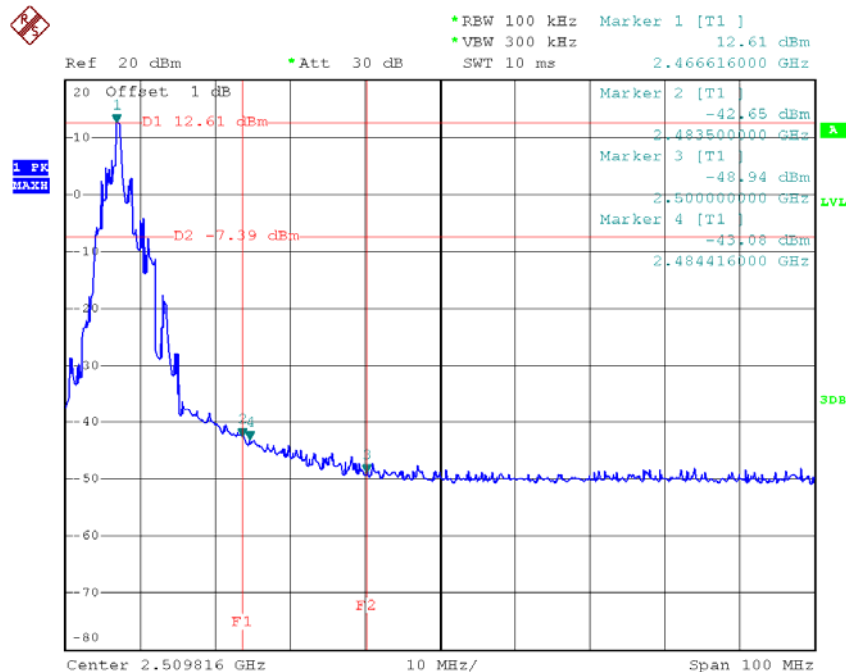


2405.376MHz



Date: 29.MAY.2014 00:05:13

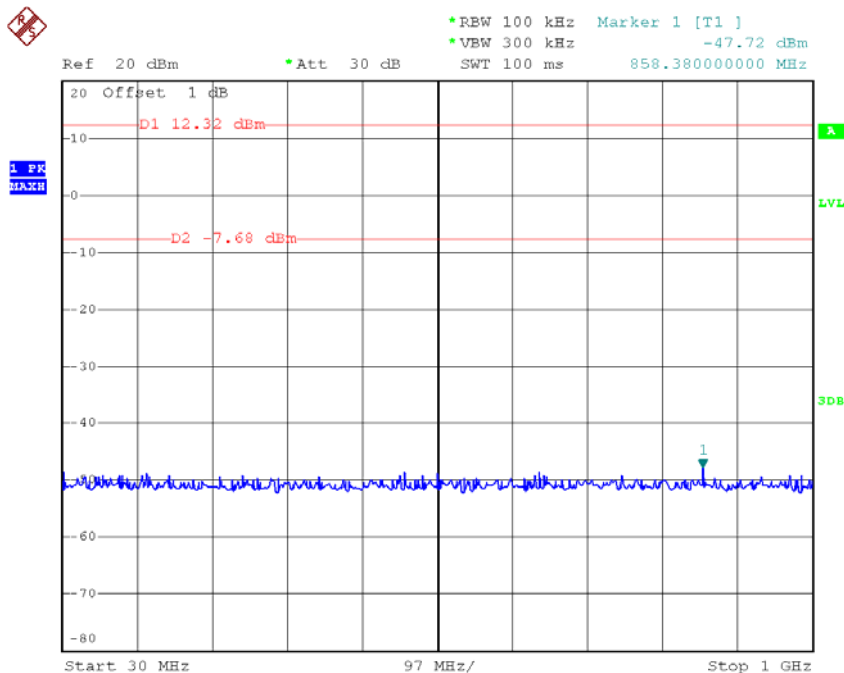
2466.816MHz



Date: 29.MAY.2014 00:15:32

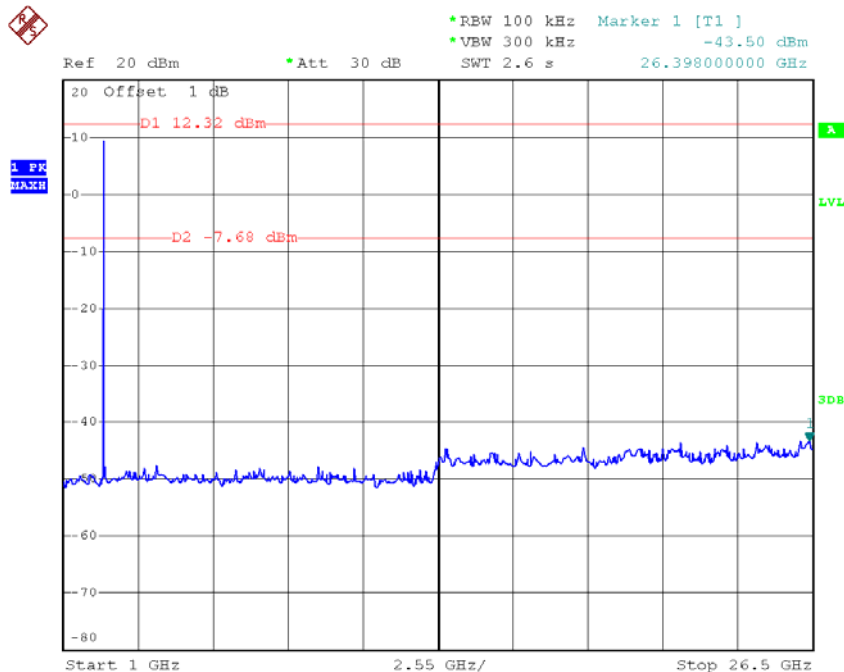


2405.376MHz (30MHz to 1000MHz)



Date: 29.MAY.2014 00:06:03

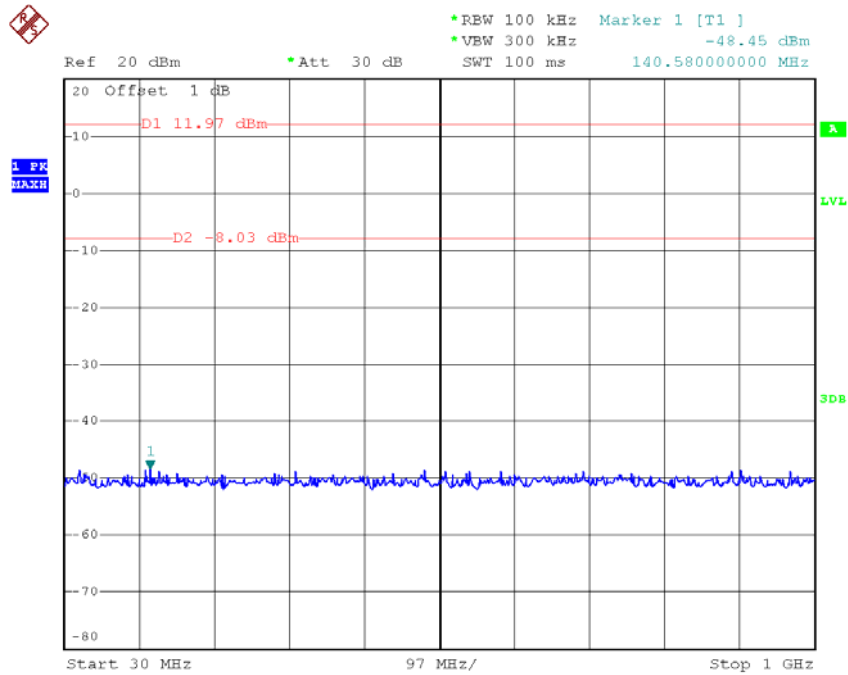
2405.376MHz (1000MHz to 10th Harmonic)



Date: 29.MAY.2014 00:06:21

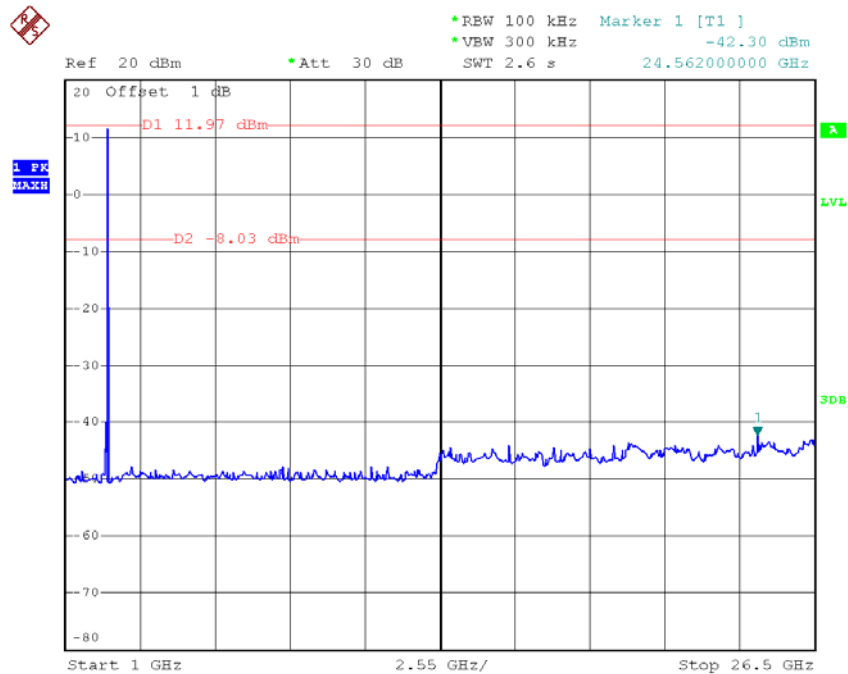


2433.024MHz (30MHz to 1000MHz)



Date: 29.MAY.2014 00:13:46

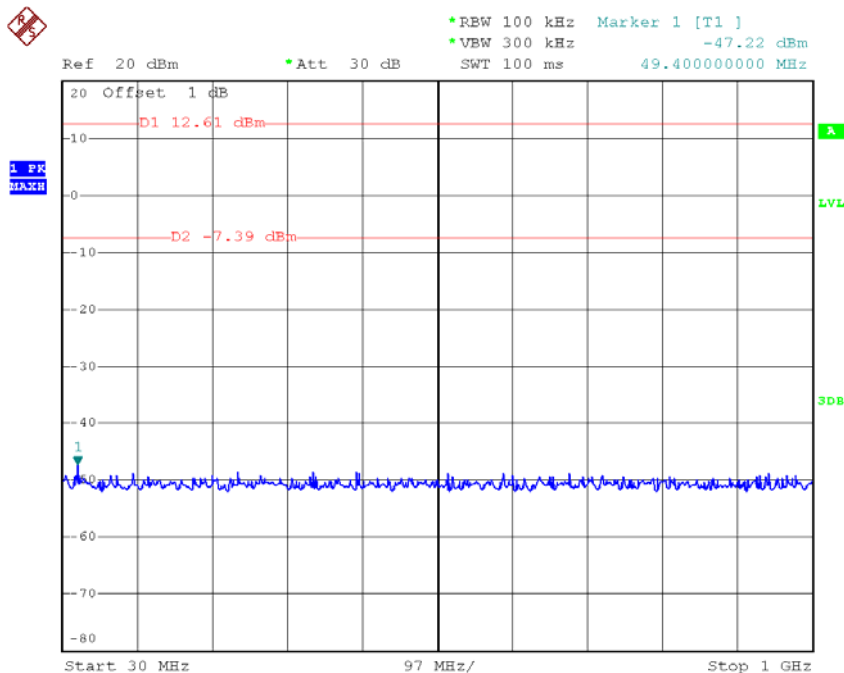
2433.024MHz (1000MHz to 10th Harmonic)



Date: 29.MAY.2014 00:14:17

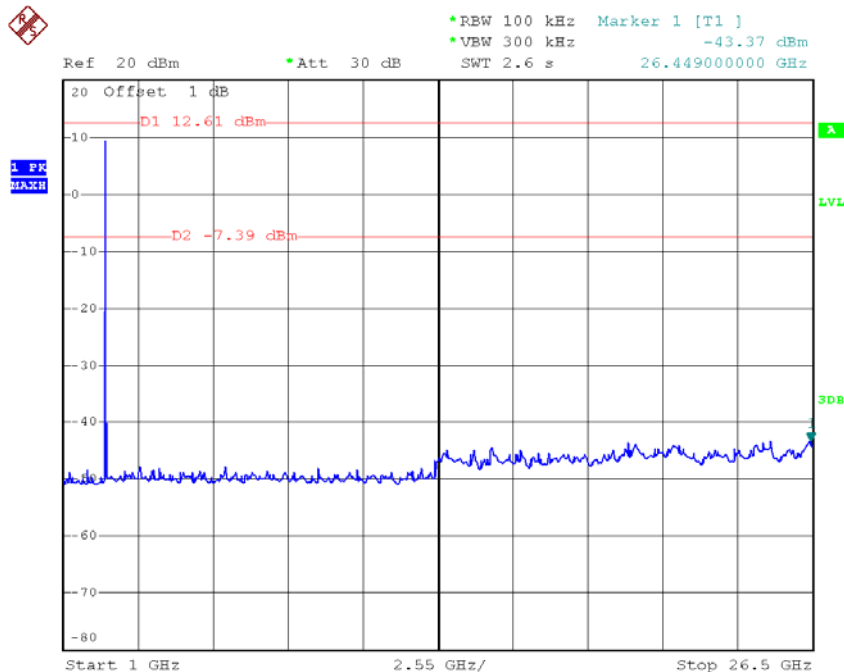


2466.816MHz (30MHz to 1000MHz)



Date: 29.MAY.2014 00:15:59

2466.816MHz (1000MHz to 10th Harmonic)



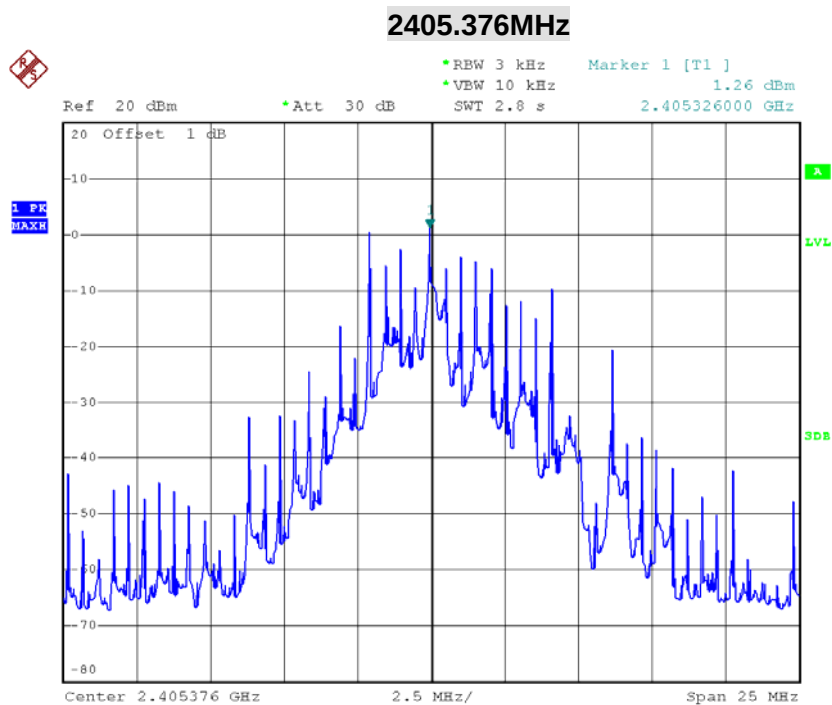
Date: 29.MAY.2014 00:16:19



ATTACHMENT H - POWER SPECTRAL DENSITY



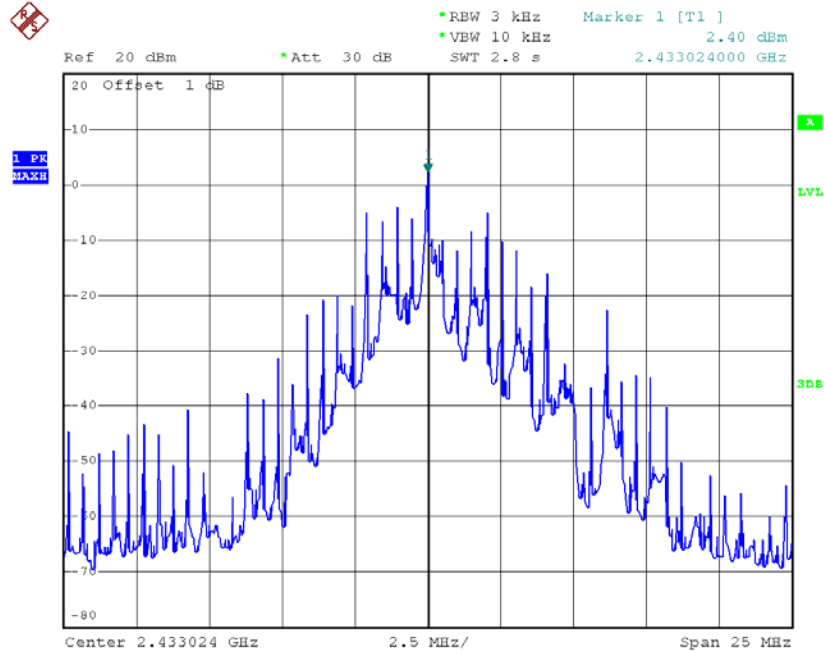
Test Mode : TX Mode



Date: 29.MAY.2014 00:08:04

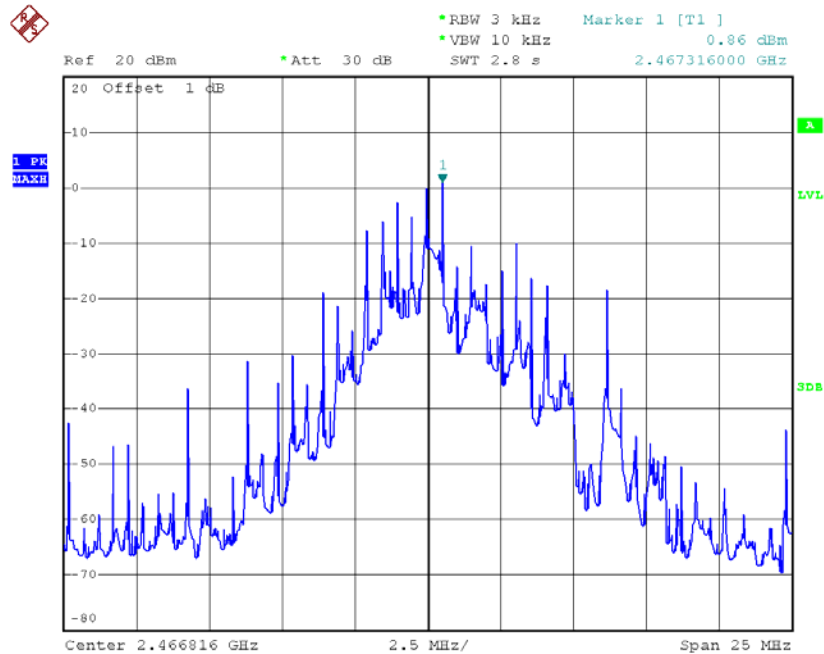


2433.024MHz



Date: 29.MAY.2014 00:09:38

2466.816MHz



Date: 29.MAY.2014 00:18:55