FCC Part 15C
Measurement and Test Report

For

HMM Diagnostics GmbH

Friedrichstr. 89, 69221 Dossenheim, Germany

FCC ID: Y9QD45428

FCC Rule(s):	FCC Part 15.249
Product Description:	Pedometer
Tested Model:	D45428
Report No.:	STR15088227I-2
Tested Date:	2015-08-24 to 2015-10-14
Issued Date:	2015-10-14
Tested By:	Jong Wang/ Engineer
Reviewed By:	Silin Chen / EMC Manager
Approved & Authorized By:	Jandy so / PSQ Manager

Prepared By:

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	HMM Diagnostics GmbH
Address of applicant:	Friedrichstr. 89, 69221 Dossenheim, Germany
Manufacturer:	HMM Diagnostics GmbH
Address of manufacturer:	Friedrichstr. 89, 69221 Dossenheim, Germany

General Description of EUT	
Product Name:	Pedometer
Trade Name:	HMM
Model No.:	D45428
Adding Models:	D45825, D45828, D45420, D45425, D45820
Rated Voltage:	DC 3 V by one CR2032 battery
Power Adapter Model:	/
Note: The test data is gathered from a production sample, provided by the manufacturer. The appearance of others models listed in the report is different from main-test model D45428, but the circuit and the electronic construction do not change, declared by the manufacturer.	

Technical Characteristics of EUT	
Frequency Range:	2403-2480MHz
Max. Field Strength:	87.62dBuV/m
Data Rate:	1Mbps
Modulation:	GFSK
Quantity of Channels:	78
Channel Separation:	1MHz
Antenna Type:	Integral Antenna
Antenna Gain:	1.75dBi
Lowest Internal Frequency of EUT:	32.768kHz
Device Category:	Portable Device

1.2 Test Standards

The following report is prepared on behalf of the HMM Diagnostics GmbH in accordance with FCC Part 15, Subpart B, Subpart C, and section 15.107, 15.203, 15.205, 15.207, 15.209 and 15.249 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.107,15.203, 15.205, 15.207, 15.209 and 15.249 of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices, and ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

1.4 Test Facility

FCC – Registration No.: 934118

Shenzhen SEM.Test Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 934118.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

CNAS Registration No.: L4062

Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C (518101).

1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	Low Channel	2403MHz
TM2	Middle Channel	2442MHz
TM3	High Channel	2480MHz

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
/	/	/	/

1.6 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Spectrum Analyzer	Agilent	E4407B	MY41440400	2015-06-17	2016-06-16
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2015-06-17	2016-06-16
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2015-06-17	2016-06-16
Amplifier	Agilent	8447F	3113A06717	2015-06-17	2016-06-16
Amplifier	C&D	PAP-1G18	2002	2015-06-17	2016-06-16
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2015-06-17	2016-06-16
Horn Antenna	ETS	3117	00086197	2015-06-17	2016-06-16
Horn Antenna	ETS	3116B	00088203	2015-06-17	2016-06-16
Loop Antenna	Schwarz beck	FMZB 1516	9773	2015-06-17	2016-06-16
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2015-06-17	2016-06-16
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2015-06-17	2016-06-16
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2015-06-17	2016-06-16

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 15.203	Antenna Requirement	Compliant
§15.205	Restricted Band of Operation	Compliant
§ 15.207(a)	Conducted Emission	Compliant
§ 15.209(a)(f)	Radiated Spurious Emissions	Compliant
§15.249(a)	Field Strength of Emissions	Compliant
§15.249(d)	Out of Band Emission	Compliant
§15.215 (c)	Emission Bandwidth	Compliant

3. Antenna Requirements

3.1 Standard Applicable

According to FCC Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

3.2 Test Result

This product has an integral antenna, fulfill the requirement of this section.

4. Radiated Emissions

4.1 Measurement Uncertainty

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ±5.10 dB.

4.2 Standard Applicable

According to §15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

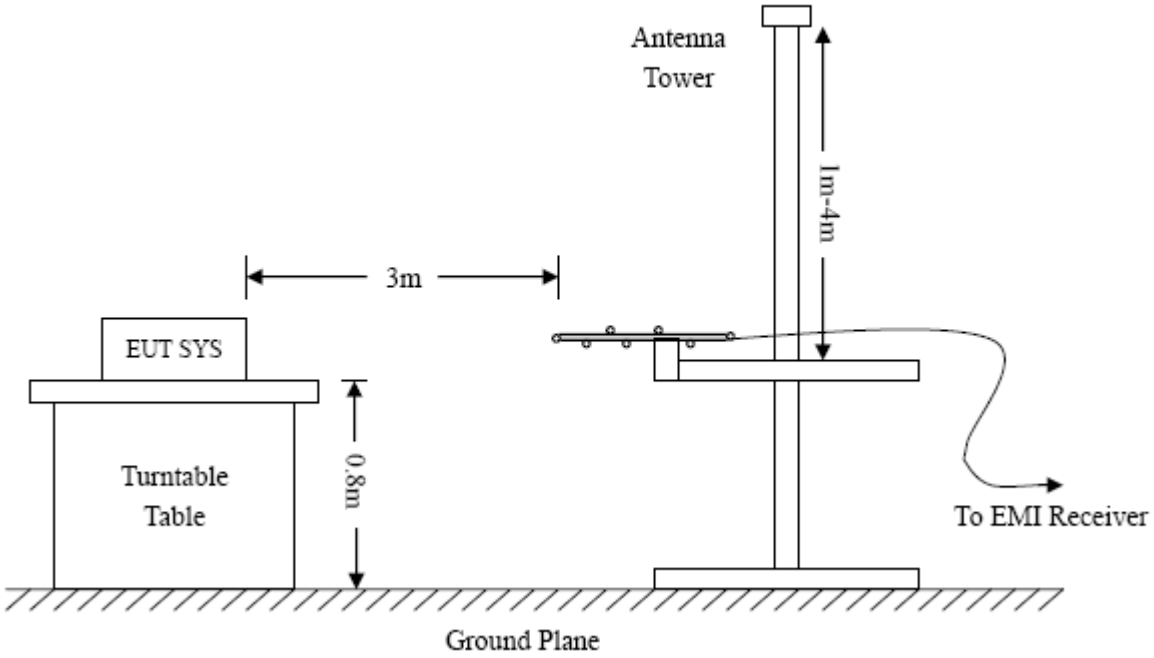
Fundamental Frequency	Field strength of fundamental (milli-volts/meter)	Field strength of Harmonics (micro-volts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

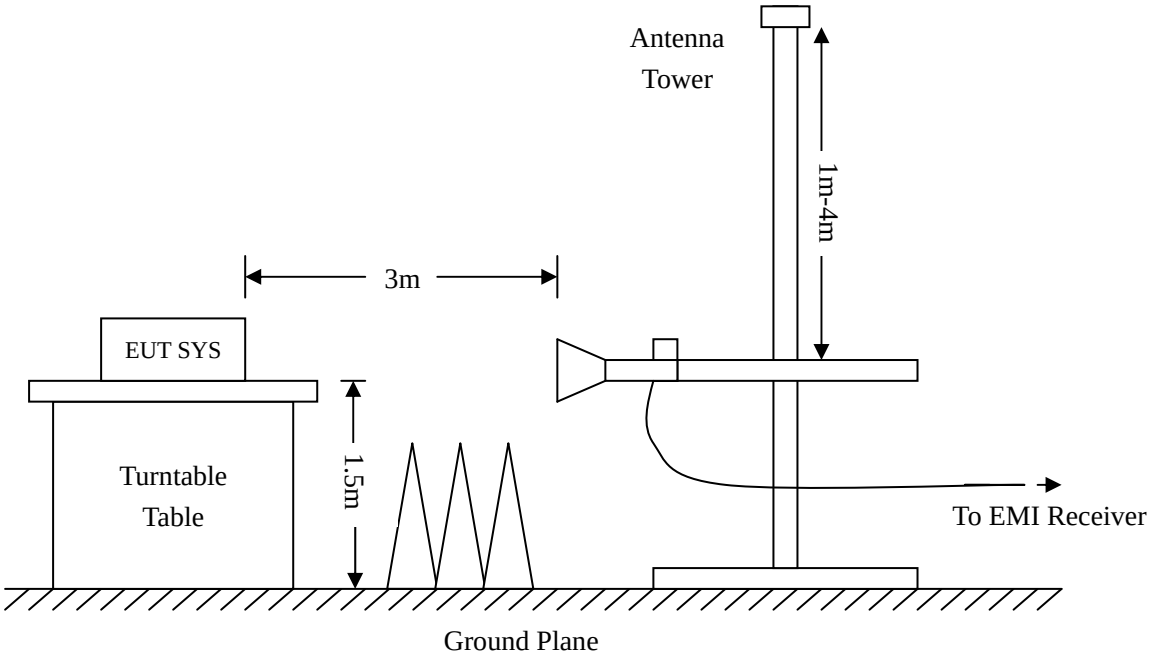
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

4.3 Test Procedure

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 15.205 15.249(a) and FCC Part 15.209 Limit.
The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.
The spacing between the peripherals was 10 cm.





Frequency :9kHz-30MHz	Frequency :30MHz-1GHz	Frequency :Above 1GHz
RBW=10KHz,	RBW=120KHz,	RBW=1MHz,
VBW =30KHz	VBW=300KHz	VBW=3MHz(Peak), 10Hz(AV)
Sweep time= Auto	Sweep time= Auto	Sweep time= Auto
Trace = max hold	Trace = max hold	Trace = max hold
Detector function = peak	Detector function = peak, QP	Detector function = peak, AV

4.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Ant. Factor + Cable Loss – Ampl. Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – FCC Part 15C Limit

4.5 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	60 %
ATM Pressure:	1012 mbar

4.6 Summary of Test Results/Plots

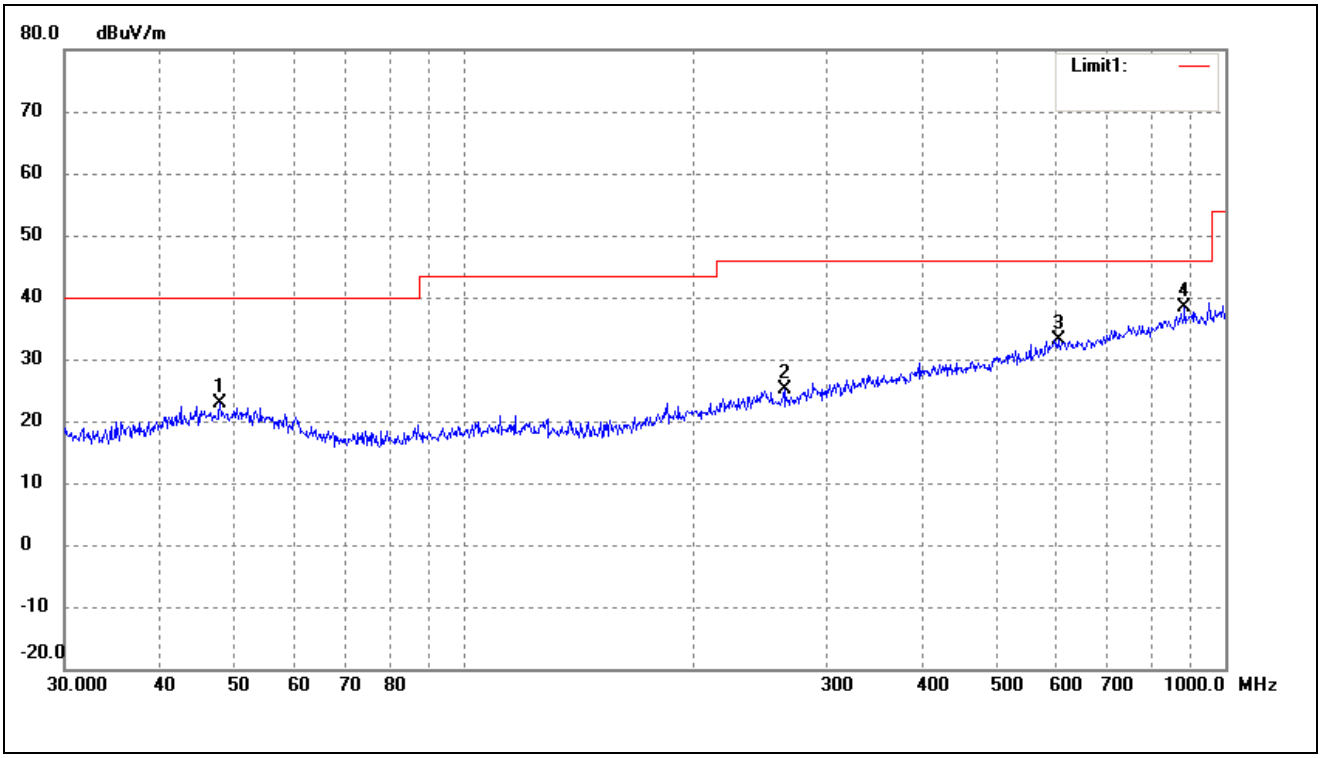
According to the data below, the FCC Part 15.205, 15.209 and 15.249 standards, and had the worst margin of:

Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

Plot of Radiated Emissions Test Data (30MHz to 1GHz)

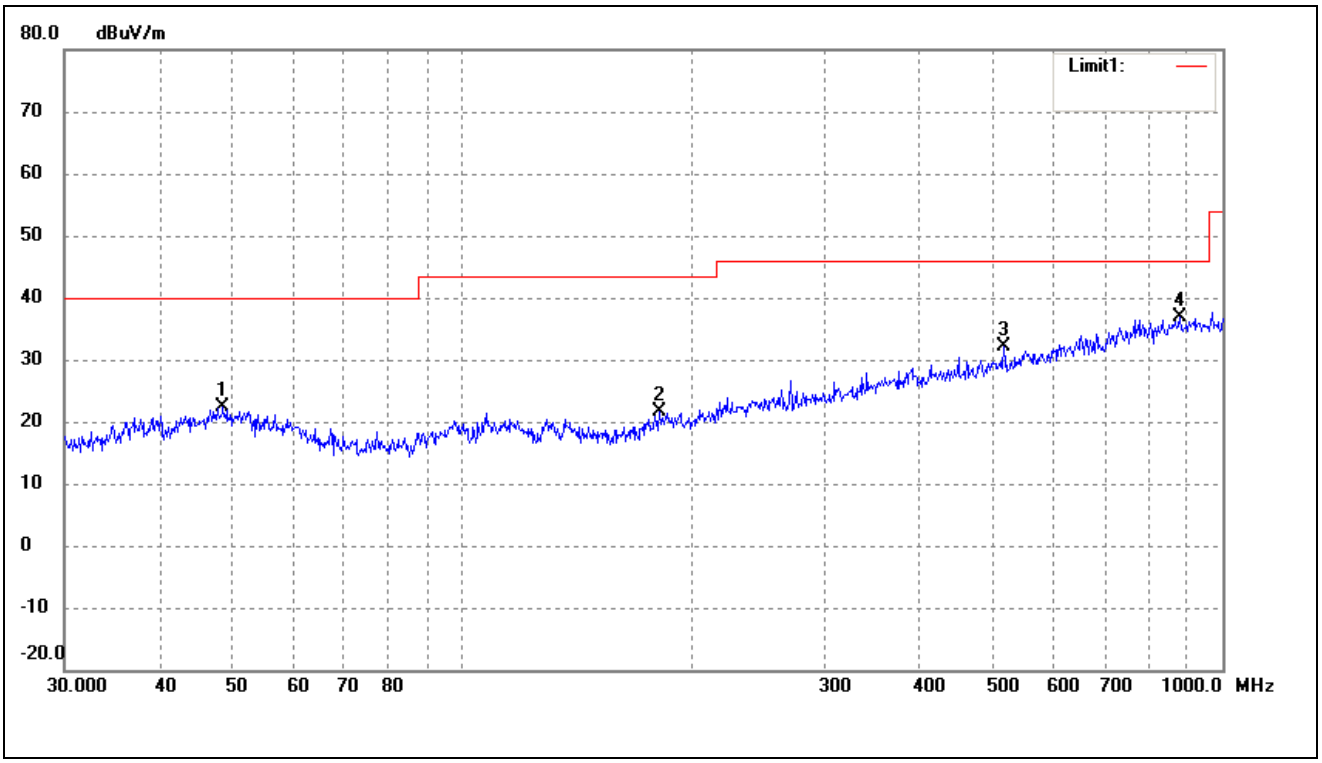
EUT: *Pedometer*
Tested Model: *D45428*
Operating Condition: *Transmitting Low Channel (2403MHz)*
Comment: *DC 3V*

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	47.9940	31.43	-8.66	22.77	40.00	-17.23	45	100	QP
2	263.8190	31.10	-6.08	25.02	46.00	-20.98	38	100	QP
3	603.5392	31.46	1.75	33.21	46.00	-12.79	167	100	QP
4	884.5029	32.81	5.48	38.29	46.00	-7.71	192	100	QP
5	845.0878	20.85	19.86	40.71	46.00	-5.29	224	100	QP

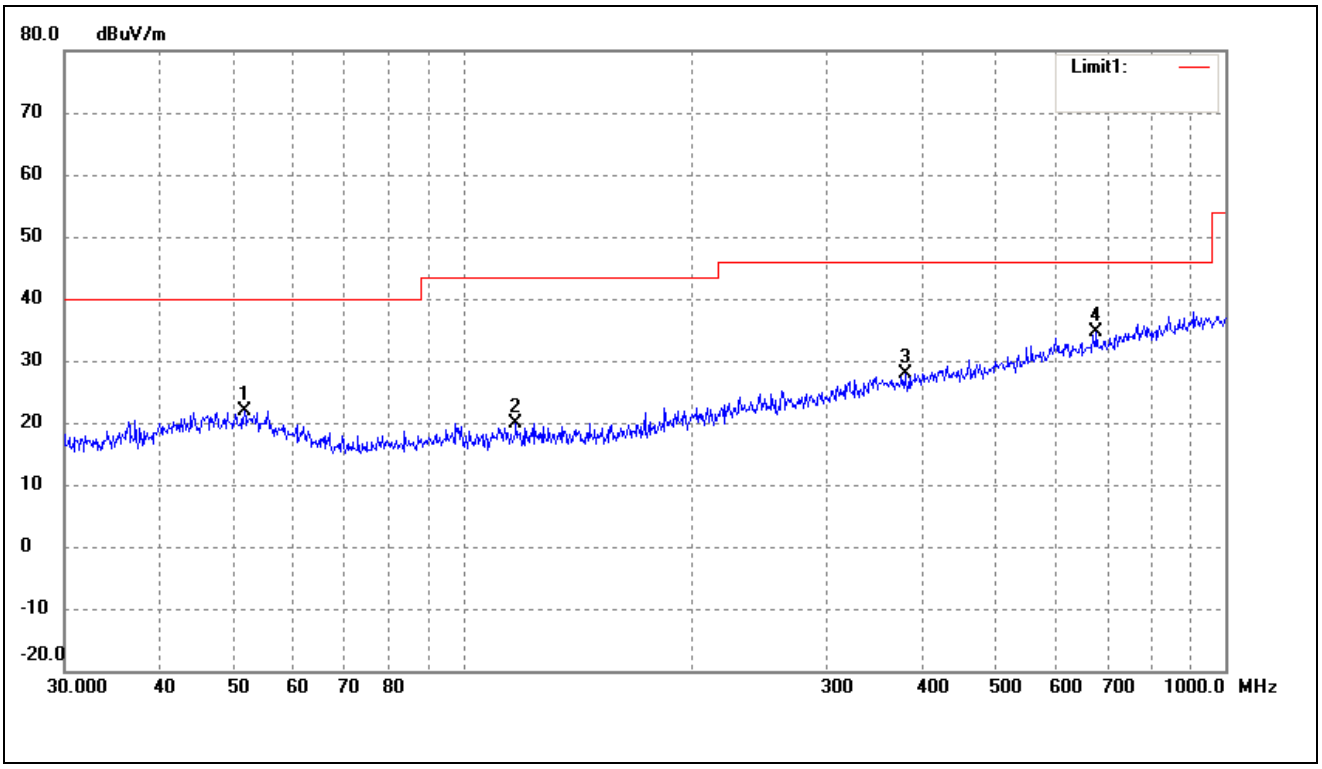
Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	48.5016	30.85	-8.58	22.27	40.00	-17.73	29	100	QP
2	181.9200	30.66	-9.10	21.56	43.50	-21.94	141	100	QP
3	515.4374	32.49	-0.29	32.20	46.00	-13.80	168	100	QP
4	878.3214	31.57	5.40	36.97	46.00	-9.03	214	100	QP

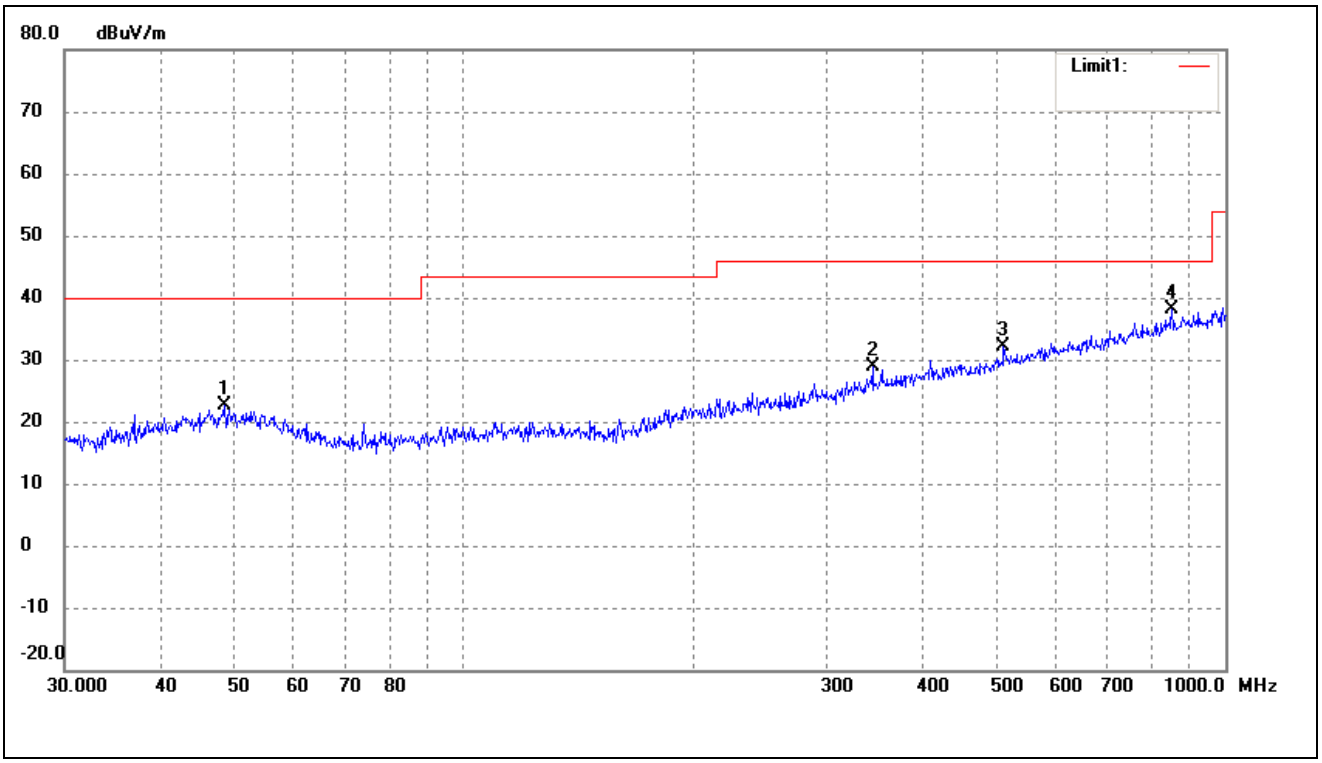
Operating Condition: *Transmitting Middle Channel (2442MHz)*
Comment: *DC 3V*

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	51.6616	30.60	-8.70	21.90	40.00	-18.10	51	100	QP
2	117.3603	30.32	-10.56	19.76	43.50	-23.74	83	100	QP
3	379.9141	30.80	-2.89	27.91	46.00	-18.09	135	100	QP
4	677.5798	32.03	2.57	34.60	46.00	-11.40	172	100	QP

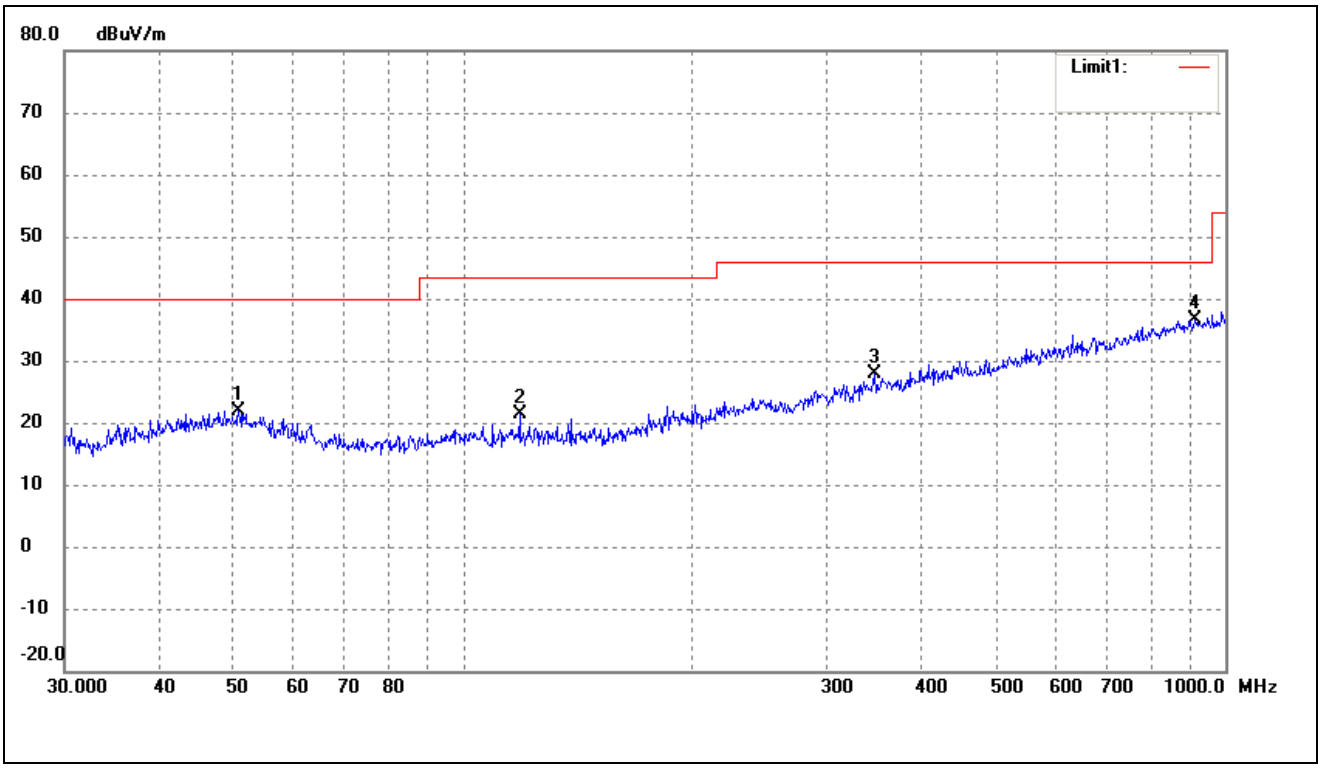
Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	48.6719	31.10	-8.55	22.55	40.00	-17.45	63	100	QP
2	344.3855	32.15	-3.38	28.77	46.00	-17.23	102	100	QP
3	511.8352	32.48	-0.36	32.12	46.00	-13.88	168	100	QP
4	851.0353	33.10	4.92	38.02	46.00	-7.98	192	100	QP

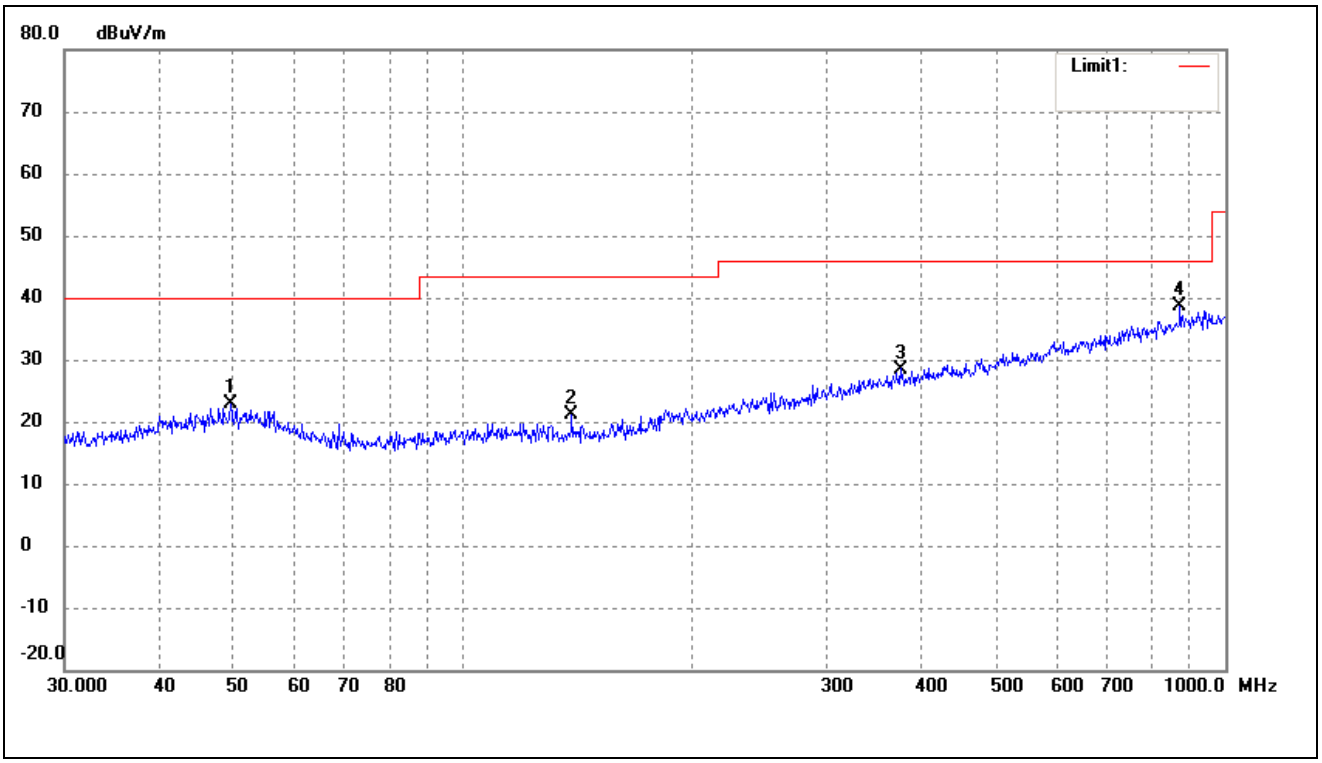
Operating Condition: *Transmitting High Channel (2480MHz)*
Comment: *DC 3V*

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	50.7637	30.47	-8.50	21.97	40.00	-18.03	64	100	QP
2	118.6014	31.85	-10.58	21.27	43.50	-22.23	127	100	QP
3	346.8092	31.05	-3.25	27.80	46.00	-18.20	169	100	QP
4	912.8620	30.85	5.73	36.58	46.00	-9.42	215	100	QP

Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	49.5328	31.30	-8.42	22.88	40.00	-17.12	68	100	QP
2	138.8735	32.04	-10.87	21.17	43.50	-22.33	139	100	QP
3	374.6226	31.54	-3.04	28.50	46.00	-17.50	180	100	QP
4	872.1832	33.46	5.29	38.75	46.00	-7.25	264	100	QP

Spurious Emissions Above 1GHz

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel-2403MHz							
2403.000	80.00	6.50	86.50	114	-27.50	H	PK
2403.000	77.11	6.50	83.61	94	-10.39	H	AV
4806.000	47.01	0.55	47.56	74	-26.44	H	PK
4806.000	34.60	0.55	35.15	54	-18.85	H	AV
7209.000	37.78	3.67	41.45	74	-32.55	H	PK
7209.000	26.91	3.67	30.58	54	-23.42	H	AV
2403.000	81.12	6.50	87.62	114	-26.38	V	PK
2403.000	78.89	6.49	85.38	94	-8.62	V	AV
4806.000	53.09	0.55	53.64	74	-20.36	V	PK
4806.000	39.47	0.55	40.02	54	-13.98	V	AV
7209.000	36.87	3.67	40.54	74	-33.46	V	PK
7209.000	26.76	3.67	30.43	54	-23.57	V	AV
Middle Channel-2442MHz							
2442	79.52	6.6	86.12	114	-27.88	H	PK
2442	76.12	6.6	82.72	94	-11.23	H	AV
4884	48.16	0.66	48.82	74	-25.18	H	PK
4884	34.98	0.66	35.64	54	-18.36	H	AV
7326	38.50	3.75	42.25	74	-31.75	H	PK
7326	27.51	3.77	31.28	54	-22.72	H	AV
2442	80.11	6.6	86.71	114	-27.29	V	PK
2442	77.77	6.6	84.37	94	-9.63	V	AV
4884	53.74	0.66	54.40	74	-19.60	V	PK
4884	38.97	0.66	39.63	54	-14.37	V	AV
7326	37.51	3.75	41.26	74	-32.74	V	PK
7326	27.56	3.79	31.35	54	-22.65	V	AV

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel-2480MHz							
2480	77.16	6.67	83.83	114	-30.09	H	PK
2480	75.54	6.67	82.21	94	-11.79	H	AV
4960	47.24	0.78	48.02	74	-25.98	H	PK
4960	34.33	0.78	35.11	54	-18.89	H	AV
7440	38.79	3.85	42.64	74	-31.36	H	PK
7440	27.41	3.88	31.29	54	-22.71	H	AV
2480	79.26	6.67	85.93	114	-28.07	V	PK
2480	77.64	6.67	84.31	94	-9.69	V	AV
4960	51.04	0.78	51.82	74	-22.18	V	PK
4960	37.05	0.78	37.83	54	-16.17	V	AV
7440	38.11	3.85	41.96	74	-32.04	V	PK
7440	27.37	3.92	31.29	54	-22.71	V	AV

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 5th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
The measurements greater than 20dB below the limit from 9kHz to 30MHz..

5. Out of Band Emissions

5.1 Standard Applicable

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 §15.209, whichever is the lesser attenuation.

5.2 Test Procedure

As the radiation test, set the Lowest and Highest Transmitting Channel, observed the outside band of 2400MHz to 2483.5MHz, than mark the higher-level emission for comparing with the FCC rules.

5.3 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	60 %
ATM Pressure:	1012 mbar

5.4 Summary of Test Results/Plots

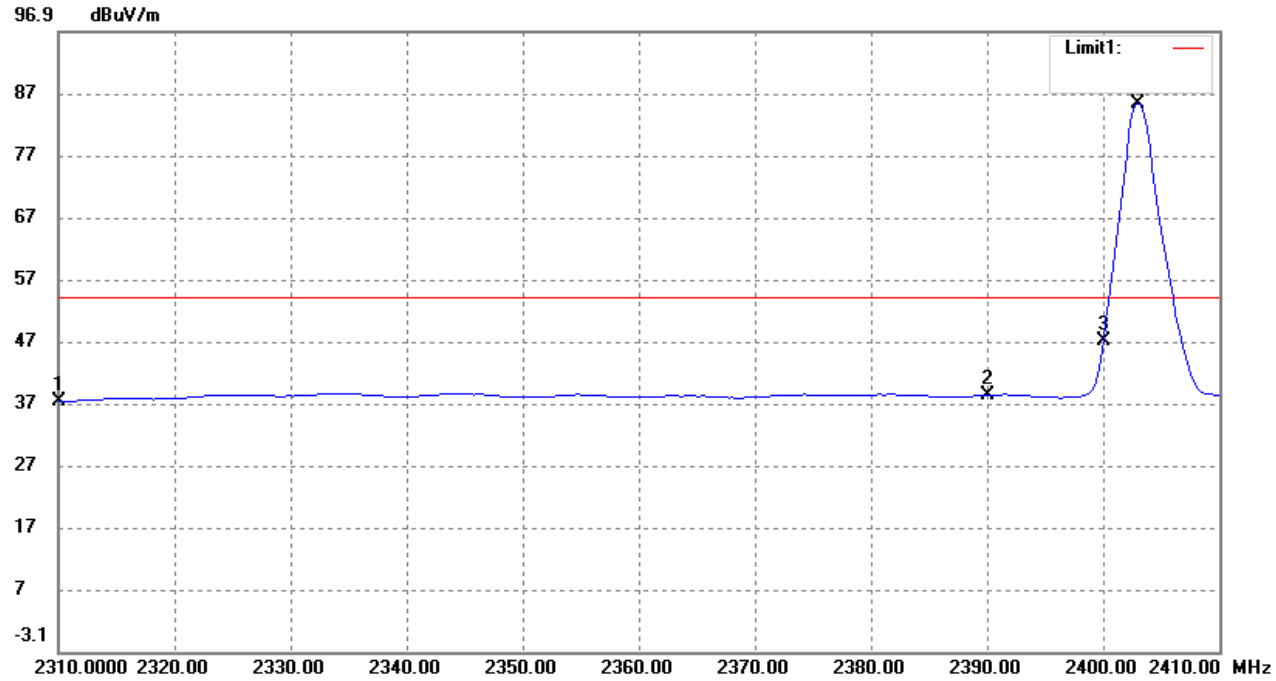
Test mode	Frequency	Limit	Result
	MHz	dBuV / dBc	
Lowest	2310.00	<54 dBuV	Pass
	2390.00	<54 dBuV	Pass
	2400.00	<54 dBuV	Pass
Highest	2483.50	<54 dBuV	Pass
	2500.00	<54 dBuV	Pass

The edge emissions are below the FCC 15.209 Limits or complies with the 15.249 requirements.

Please refer to the test plots as below.

Lowest Bandedge

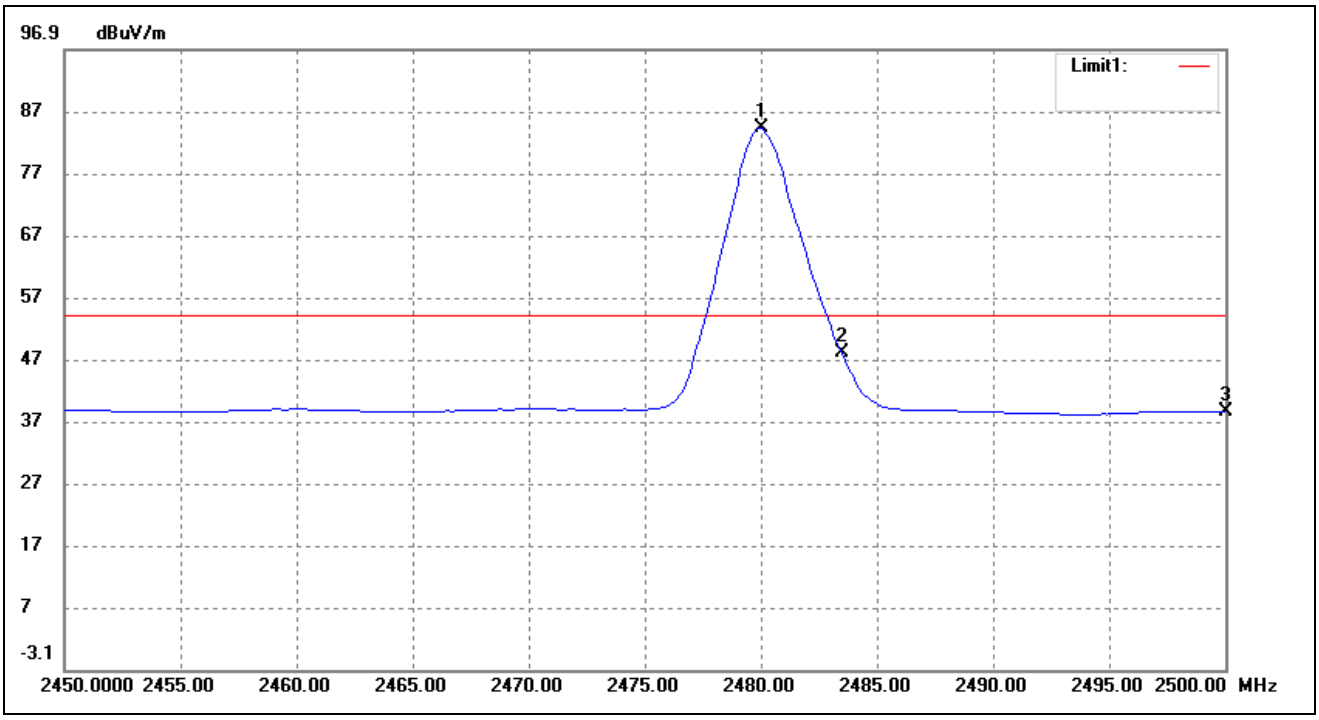
Vertical (Worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	31.02	6.29	37.31	54.00	-16.69	Ave Detector
	2310.000	42.47	6.29	48.76	74.00	-25.24	Peak Detector
2	2390.000	31.82	6.46	38.28	54.00	-15.72	Ave Detector
	2390.000	43.10	6.46	49.56	74.00	-24.44	Peak Detector
3	2400.000	40.56	6.49	47.05	54.00	-6.95	Ave Detector
	2400.000	46.73	6.49	53.22	74.00	-20.78	Peak Detector

Highest Bandedge

Vertical (Worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
2	2483.500	41.30	6.67	47.97	54.00	-6.03	Ave Detector
	2483.500	48.44	6.67	55.11	74.00	-18.89	Peak Detector
3	2500.000	31.70	6.72	38.42	54.00	-15.58	Ave Detector
	2500.000	43.51	6.72	50.23	74.00	-23.77	Peak Detector

6. Emission Bandwidth

6.1 Standard Applicable

According to 15.215 (c), intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

6.2 Test Procedure

According to the ANSI 63.4-2014, the emission bandwidth test method as follows.

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
Set span = 1MHz, centered on a transmitting channel
RBW ≥1% 20dB Bandwidth, VBW ≥RBW
Sweep = auto
Detector function = peak
Trace = max hold
All the trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission, use the marker-delta function to measure and record the 20dB down and 99% bandwidth of the emission.

6.3 Environmental Conditions

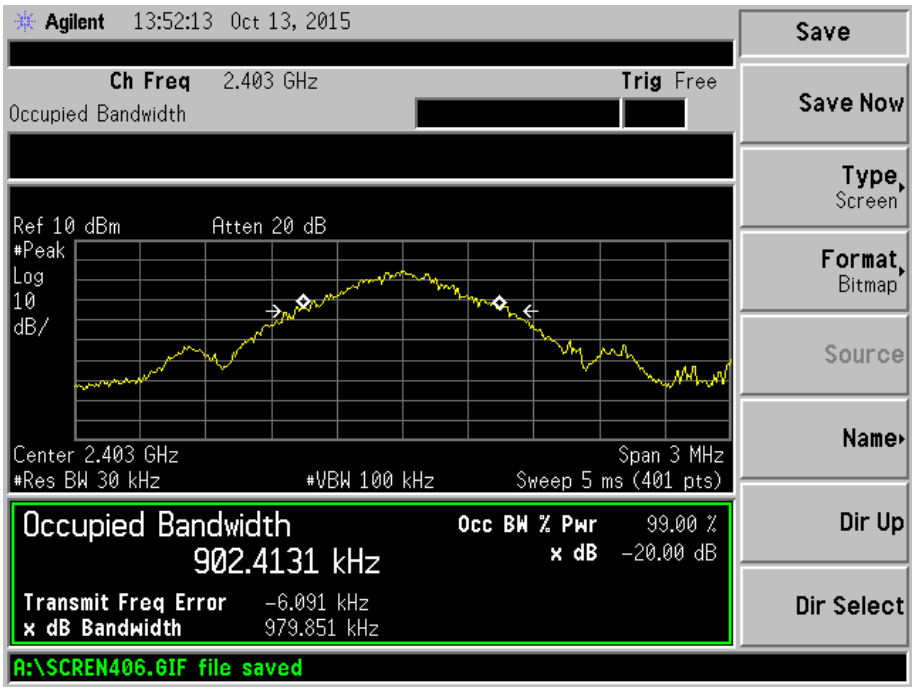
Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

6.4 Summary of Test Results/Plots

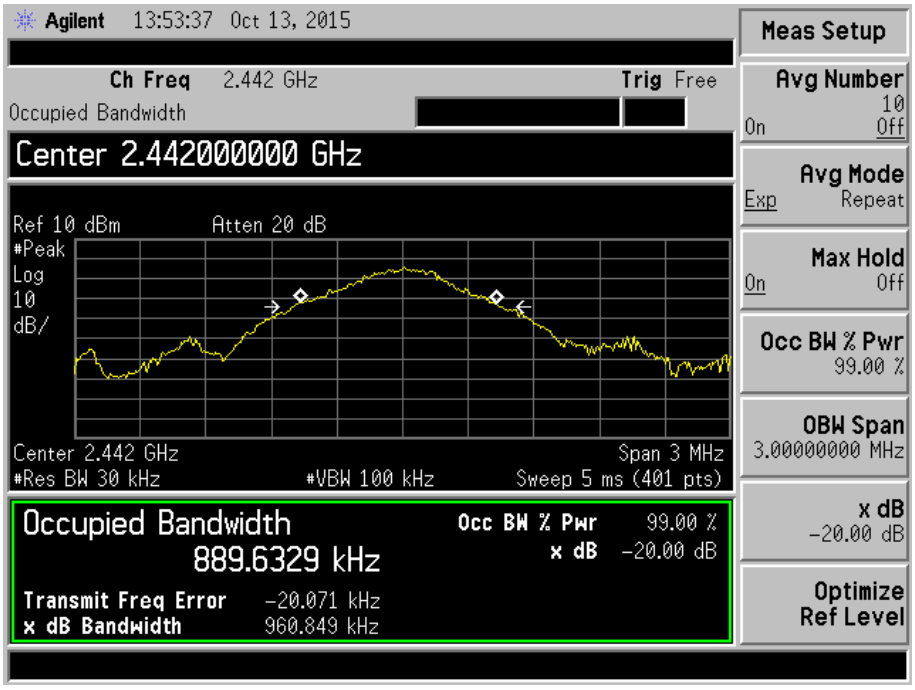
Channel	Frequency MHz	20dB Bandwidth kHz	99% Bandwidth kHz
Low Channel	2403	979.851	902.4131
Middle Channel	2442	960.849	889.6329
High Channel	2480	1035	963.2184

Please refer to the following test plots

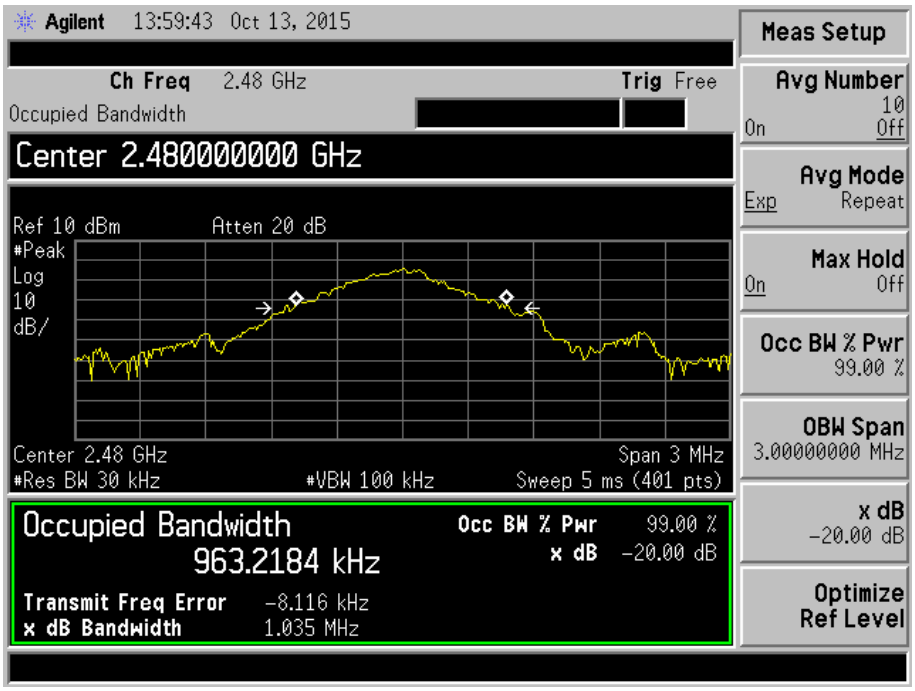
Low Channel:



Middle Channel:



High Channel:



******* END OF REPORT *******