

FCC Part 15C Measurement and Test Report

For

ENVOTECH NETWORK SDN BHD

NO. 1, Lot 4324N, Bulatan Cherry Off Jalan Tun Abdul Razak,

30100 Ipoh, Perak, Malaysia.

FCC ID: CO8-RSM20150518

FCC Rule(s):	<u>FCC Part 15.249</u>
Product Description:	<u>RadioSecure SLM</u>
Tested Model:	<u>RS-SLM-324x</u>
Report No.:	<u>STR15058042I-2</u>
Tested Date:	<u>2015-05-08 to 2015-05-23</u>
Issued Date:	<u>2015-05-23</u>
Tested By:	<u>Lebron Wang / Engineer</u>
Reviewed By:	<u>Lahm Peng / EMC Manager</u>
Approved & Authorized By:	<u>Jandy so / PSQ Manager</u>
Prepared By:	

Lebron Wang

Lahm peng

Jandyso

Shenzhen SEM.Test Technology Co., Ltd.

1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road,
Bao'an District, Shenzhen, P.R.C. (518101)

Tel.: +86-755-33663308 Fax.: +86-755-33663309 Website: www.semtest.com.cn

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM.Test Technology Co., Ltd.

TABLE OF CONTENTS

1. GENERAL INFORMATION.....	3
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....	3
1.2 TEST STANDARDS.....	4
1.3 TEST METHODOLOGY.....	4
1.4 TEST FACILITY	4
1.5 EUT SETUP AND TEST MODE	5
2. SUMMARY OF TEST RESULTS	6
3. ANTENNA REQUIREMENTS.....	7
3.1 STANDARD APPLICABLE.....	7
3.2 TEST RESULT.....	7
4. RADIATED EMISSIONS.....	8
4.1 MEASUREMENT UNCERTAINTY	8
4.2 STANDARD APPLICABLE.....	8
4.3 TEST EQUIPMENT LIST AND DETAILS	8
4.4 TEST PROCEDURE.....	9
4.5 CORRECTED AMPLITUDE & MARGIN CALCULATION.....	10
4.6 ENVIRONMENTAL CONDITIONS	10
4.7 SUMMARY OF TEST RESULTS/PLOTS	10
5. OUT OF BAND EMISSIONS.....	21
5.1 STANDARD APPLICABLE.....	21
5.2 TEST EQUIPMENT LIST AND DETAILS	21
5.3 TEST PROCEDURE.....	21
5.4 ENVIRONMENTAL CONDITIONS	21
5.5 SUMMARY OF TEST RESULTS/PLOTS	21
6. EMISSION BANDWIDTH.....	24
6.1 STANDARD APPLICABLE.....	24
6.2 TEST EQUIPMENT LIST AND DETAILS	24
6.3 TEST PROCEDURE.....	24
6.4 ENVIRONMENTAL CONDITIONS	24
6.5 SUMMARY OF TEST RESULTS/PLOTS	24
7. CONDUCTED EMISSIONS	27
7.1 MEASUREMENT UNCERTAINTY	27
7.2 TEST EQUIPMENT LIST AND DETAILS	27
7.3 TEST PROCEDURE.....	27
7.4 BASIC TEST SETUP BLOCK DIAGRAM.....	27
7.5 ENVIRONMENTAL CONDITIONS	28
7.6 TEST RECEIVER SETUP	28
7.7 SUMMARY OF TEST RESULTS/PLOTS	28
7.8 CONDUCTED EMISSIONS TEST DATA.....	28

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: ENVOTECH NETWORK SDN BHD
Address of applicant: NO. 1, Lot 4324N, Bulatan Cherry Off Jalan Tun Abdul Razak, 30100 Ipoh, Perak, Malaysia.
Manufacturer: ENVOTECH NETWORK SDN BHD
Address of manufacturer: NO. 1, Lot 4324N, Bulatan Cherry Off Jalan Tun Abdul Razak, 30100 Ipoh, Perak, Malaysia.

General Description of EUT	
Product Name:	RadioSecure SLM
Trade Name:	RADIOSECURE
Model No.:	RS-SLM-324x
Adding Model(s):	RadioSecure SLM/SLM-i/SLM-x/SLM-m/SLM-b/ SLM-mb/SLM-UHF/IVM/CTU/site manager/ UHF Reader
Rated Voltage:	DC 3.7V
Power Adapter Model:	/
<i>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 RS-SLM-324x, but the circuit and the electronic construction do not change, declared by the manufacturer.</i>	

Technical Characteristics of EUT	
Frequency Range:	2410-2430MHz
Max. Field Strength:	104.67dBuV/m
Data Rate:	/
Modulation:	GFSK
Quantity of Channels:	/
Antenna Type:	Internal Antenna
Antenna Gain:	0dBi
Lowest Internal Frequency of EUT:	32.768kHz

1.2 Test Standards

The following report is prepared on behalf of the ENVOTECH NETWORK SDN BHD 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 C63.4-2009, 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	2410MHz
TM2	Middle Channel	2420MHz
TM3	High Channel	2430MHz

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

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

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 Equipment List and Details

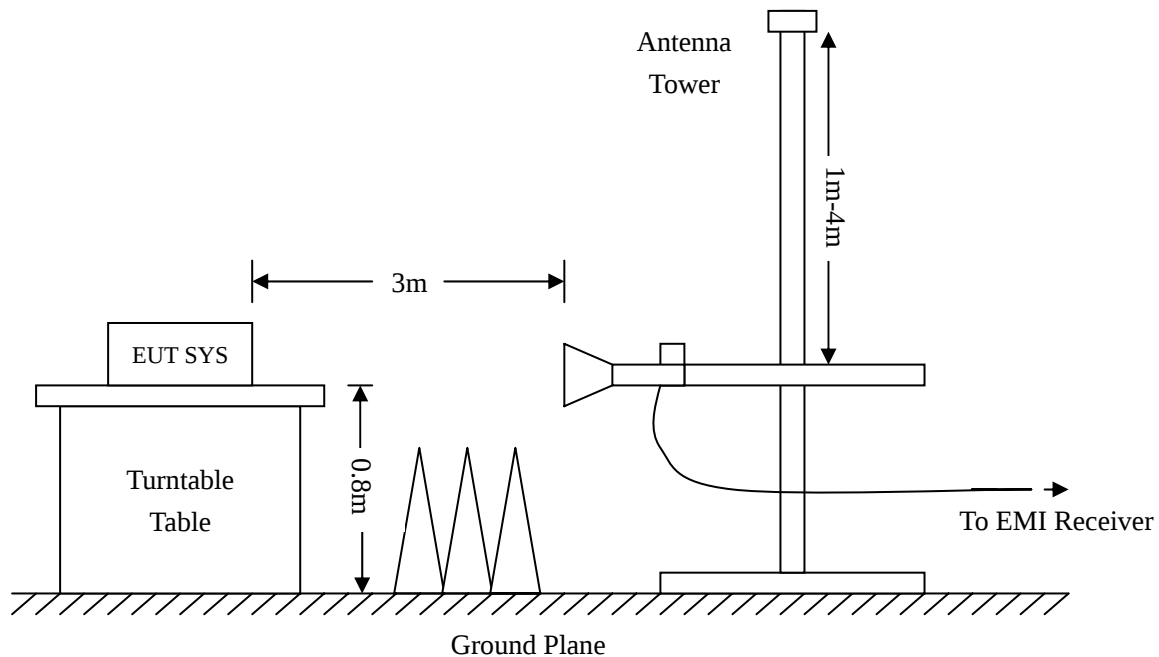
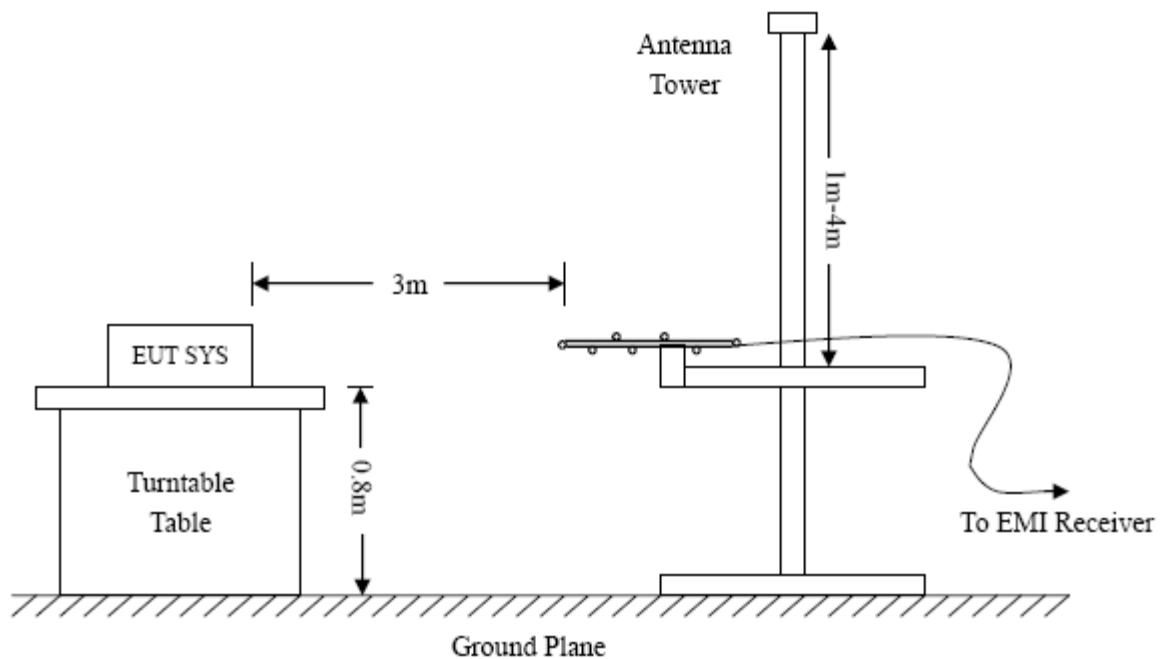
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2014-05-28	2015-05-27
EMI Test Receiver	R&S	ESVB	825471/005	2014-05-28	2015-05-27
Pre-amplifier	Agilent	8447F	3113A06717	2014-05-28	2015-05-27
Pre-amplifier	Compliance Direction	PAP-0118	24002	2014-05-28	2015-05-27
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2014-05-24	2015-05-23
Horn Antenna	ETS	3117	00086197	2014-05-24	2015-05-23
Horn Antenna	ETS	3116B	00088203	2014-05-24	2015-05-23
Loop Antenna	SCHWARZECK	HFRA 5165	9365	2014-05-24	2015-05-23

4.4 Test Procedure

The setup of EUT is according with per ANSI C63.4-2009 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

RBW=10KHz,

VBW =30KHz

Sweep time= Auto

Trace = max hold

Detector function = peak

Frequency :30MHz-1GHz

RBW=120KHz,

VBW=300KHz

Sweep time= Auto

Trace = max hold

Detector function = peak, QP

Frequency :Above 1GHz

RBW=1MHz,

VBW=3MHz(Peak), 10Hz(AV)

Sweep time= Auto

Trace = max hold

Detector function = peak, AV

4.5 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:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Ant. Factor} + \text{Cable Loss} - \text{Ampl. Gain}$$

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:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15C Limit}$$

4.6 Environmental Conditions

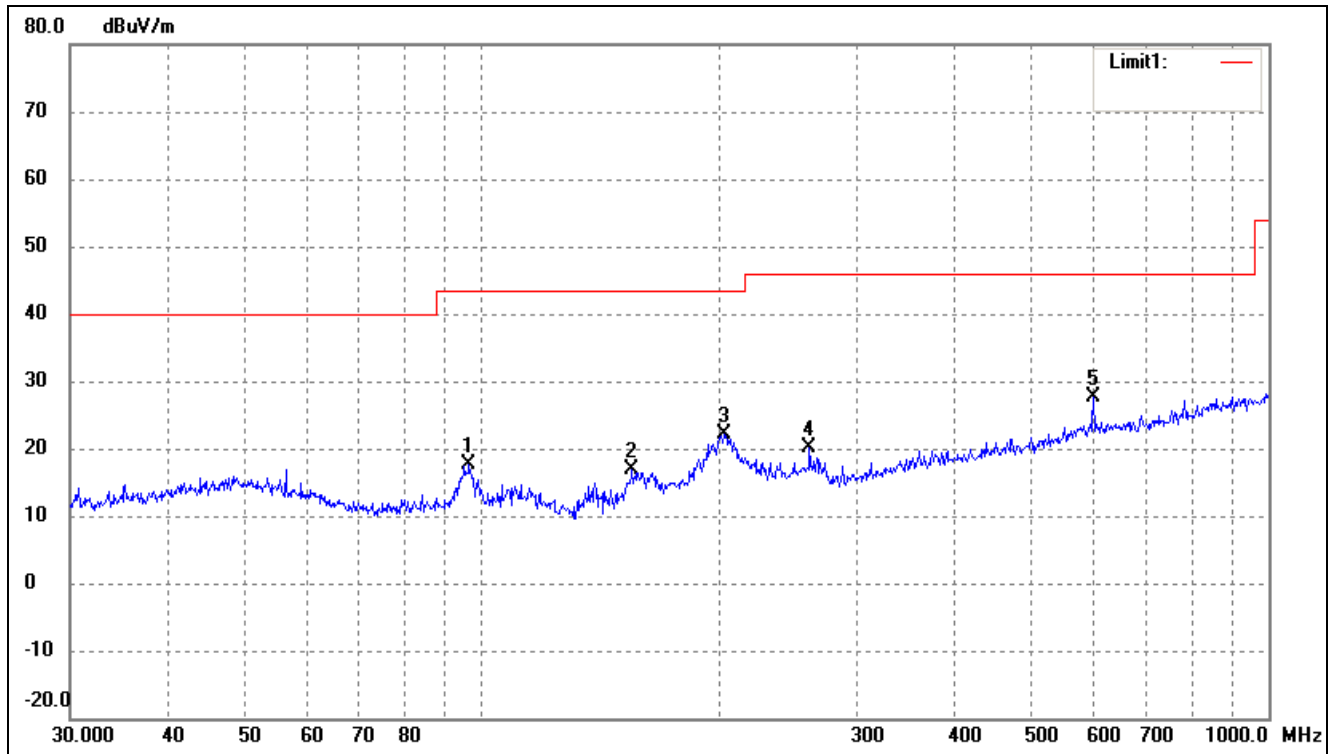
Temperature:	24 °C
Relative Humidity:	60 %
ATM Pressure:	1012 mbar

4.7 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:

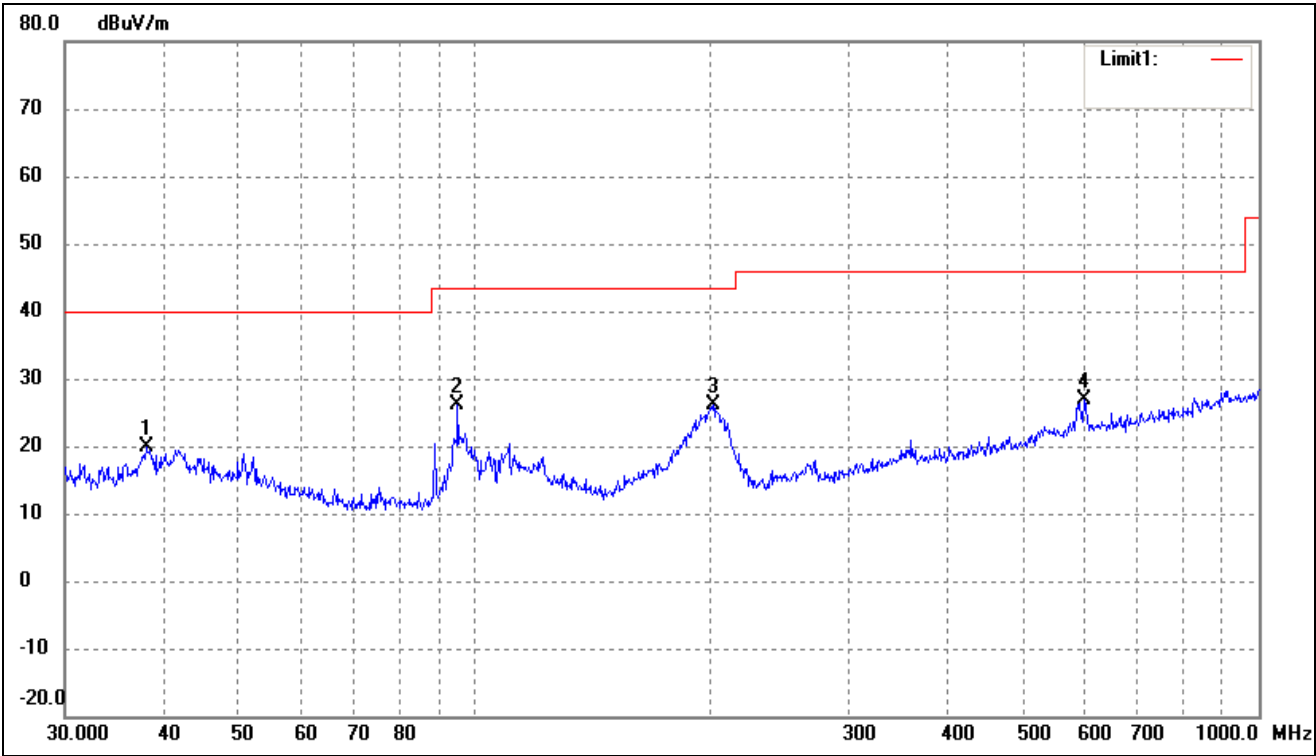
-9.08 dB at 12050 MHz in the Vertical polarization, Low Channel of Antenna 1, 9 kHz to 25 GHz, 3Meters

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

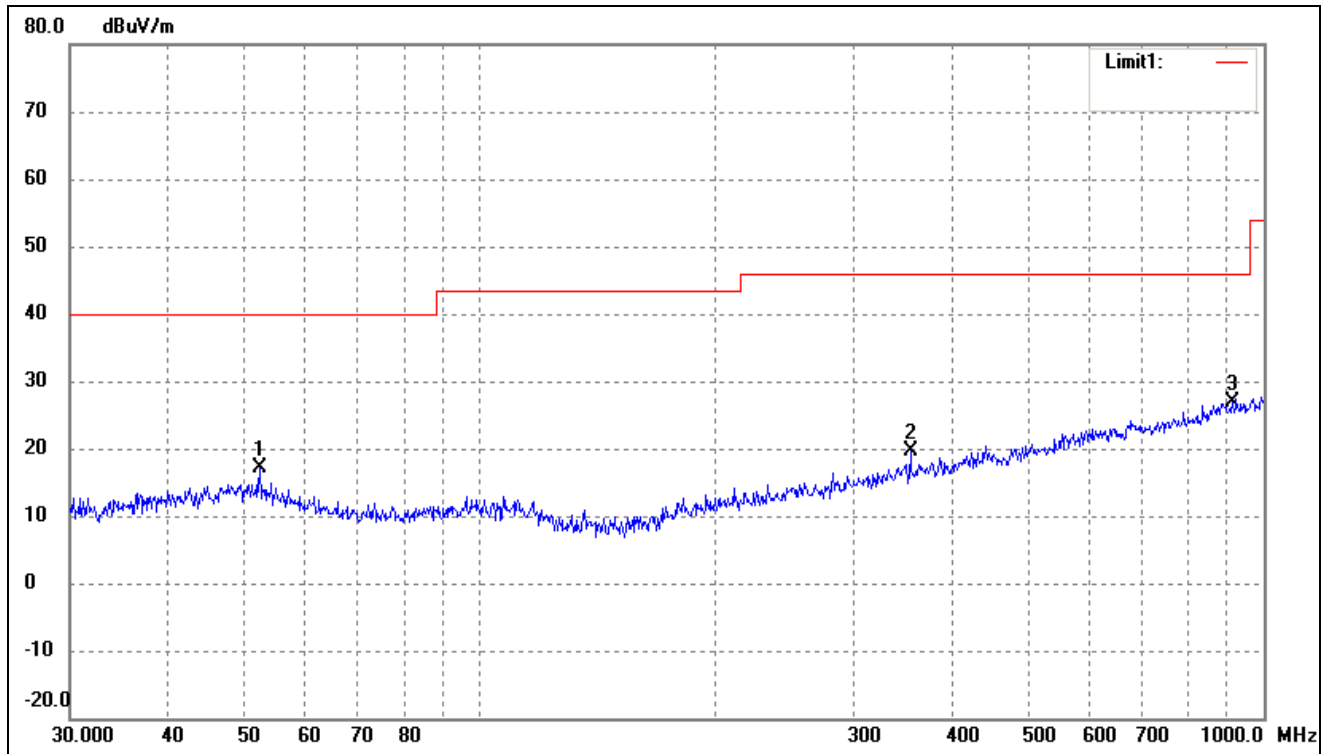
Plot of Radiated Emissions Test Data (30MHz to 1GHz)*EUT:* RadioSecure SLM*Tested Model:* RS-SLM-324x*Operating Condition:* Charging*Comment:* USB DC 5V*Test Specification:* Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct dB	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	96.4362	28.81	-11.16	17.65	43.50	-25.85	264	100	peak
2	155.3644	30.29	-13.30	16.99	43.50	-26.51	113	100	peak
3	203.5228	32.63	-10.44	22.19	43.50	-21.31	287	100	peak
4	261.0583	28.33	-8.31	20.02	46.00	-25.98	185	100	peak
5	599.3213	28.28	-0.76	27.52	46.00	-18.48	110	100	QP

Test Specification: Vertical

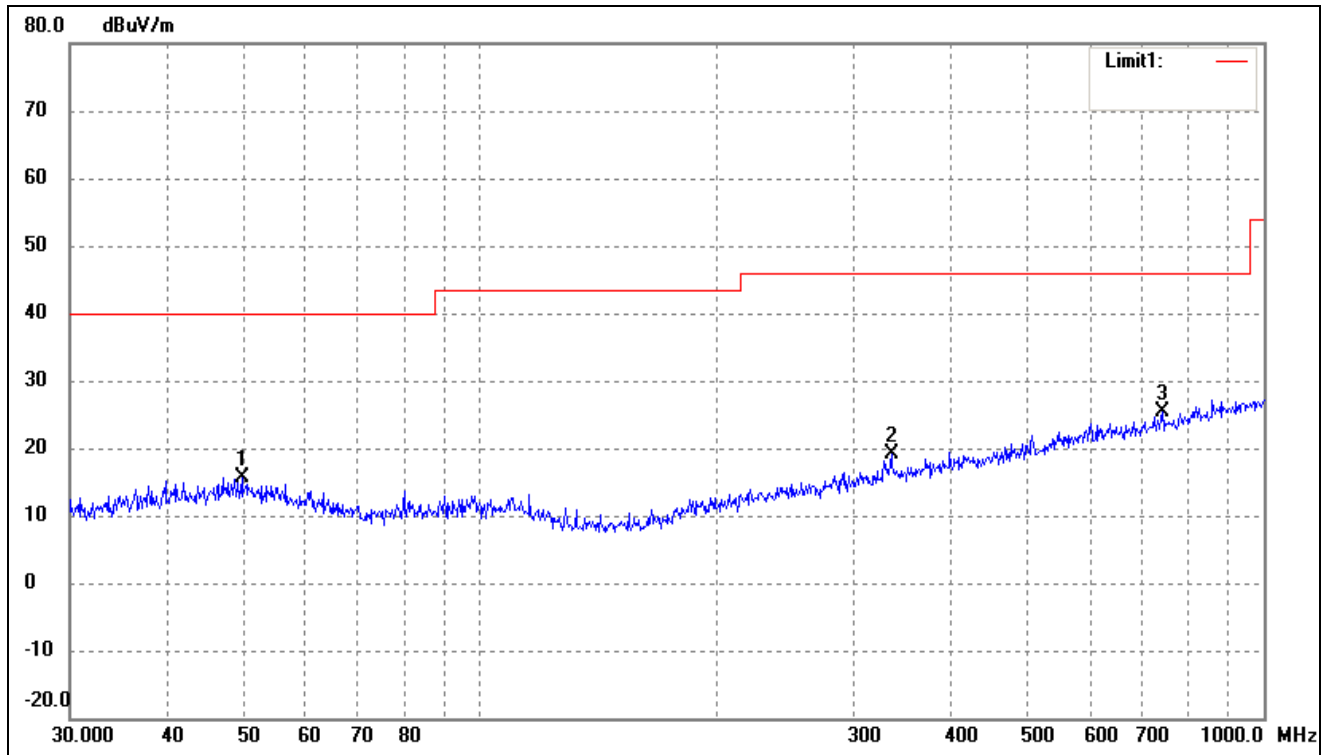


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV)	dB	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	38.0783	29.56	-9.69	19.87	40.00	-20.13	234	100	peak
2	95.0930	37.34	-11.28	26.06	43.50	-17.44	118	100	peak
3	201.3930	36.61	-10.52	26.09	43.50	-17.41	164	100	peak
4	599.3213	27.58	-0.76	26.82	46.00	-19.18	178	100	peak

Plot of Radiated Emissions Test Data (30MHz to 1GHz)*EUT:* RadioSecure SLM*Tested Model:* RS-SLM-324x*Operating Condition:* Transmitting Low Channel (2410MHz)*Comment:* Battery DC 3.8V*Test Specification:* Horizontal

No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV)	dB	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	52.3913	25.50	-8.48	17.02	40.00	-22.98	264	100	peak
2	354.1831	25.16	-5.62	19.54	46.00	-26.46	113	200	peak
3	912.8620	23.62	3.14	26.76	46.00	-19.24	287	100	peak

Test Specification: Vertical

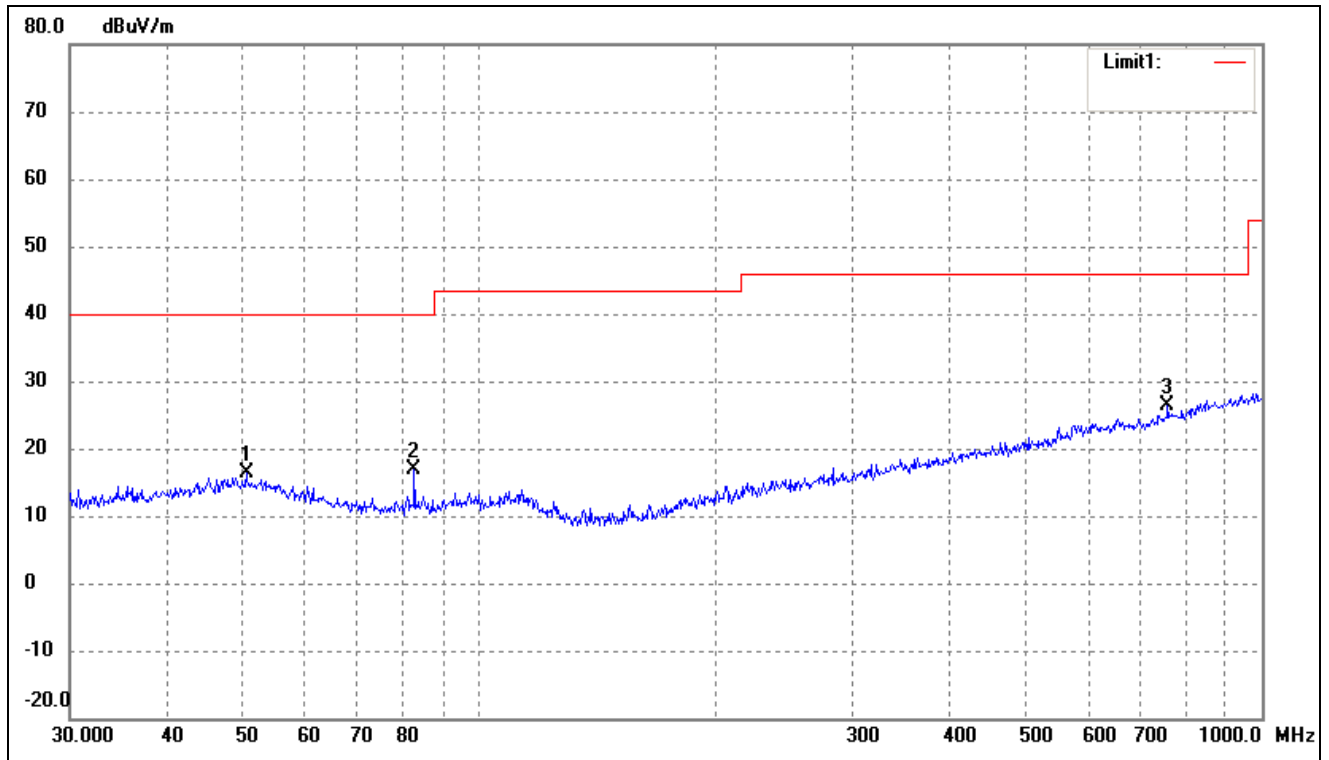


No.	Frequency (MHz)	Reading (dBuV)	Correct dB	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	49.7068	23.55	-8.01	15.54	40.00	-24.46	234	100	peak
2	334.8589	25.32	-6.27	19.05	46.00	-26.95	118	100	QP
3	742.2587	24.38	1.11	25.49	46.00	-20.51	164	100	QP

Operating Condition: Transmitting Middle Channel (2420MHz)

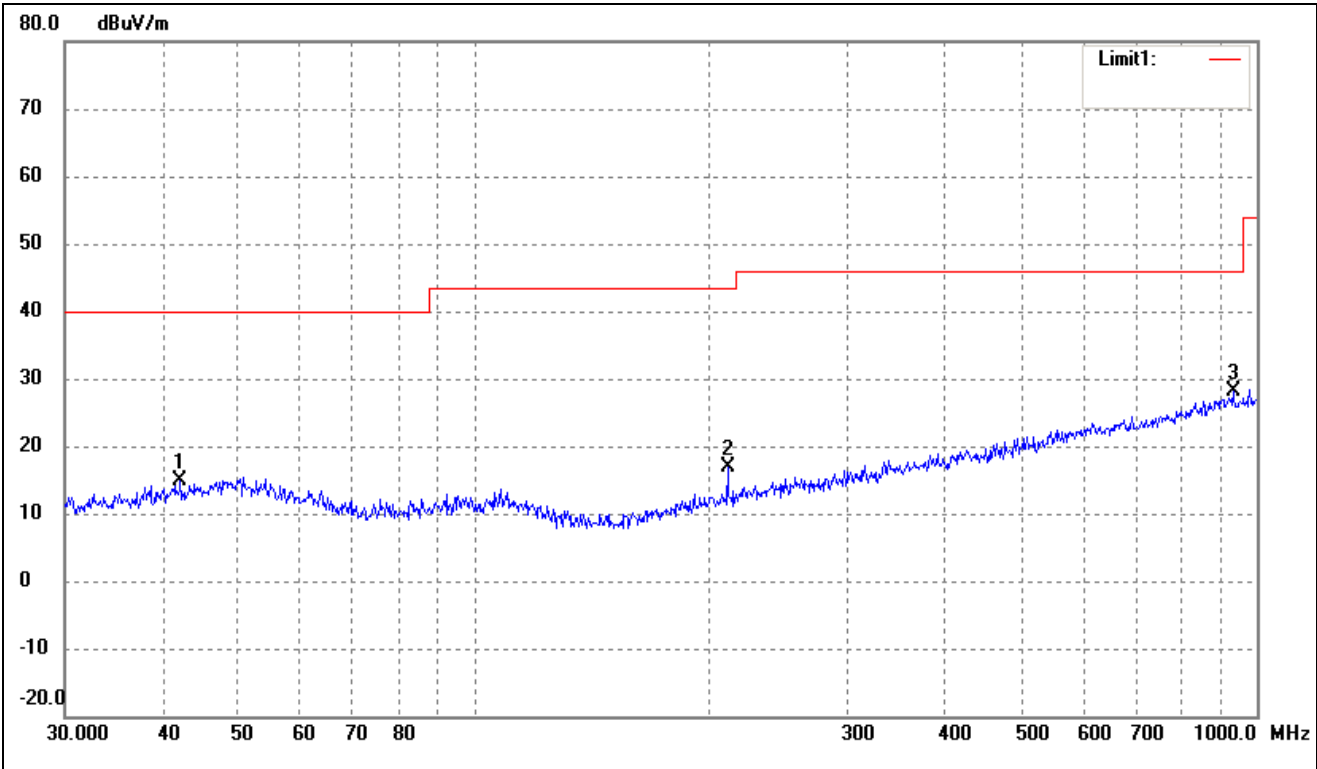
Comment: Battery DC 3.8V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correct dB	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	50.4089	24.52	-8.06	16.46	40.00	-23.54	162	100	peak
2	82.6482	28.69	-11.86	16.83	40.00	-23.17	200	100	peak
3	758.0408	25.01	1.35	26.36	46.00	-19.64	138	100	peak

Test Specification: Vertical

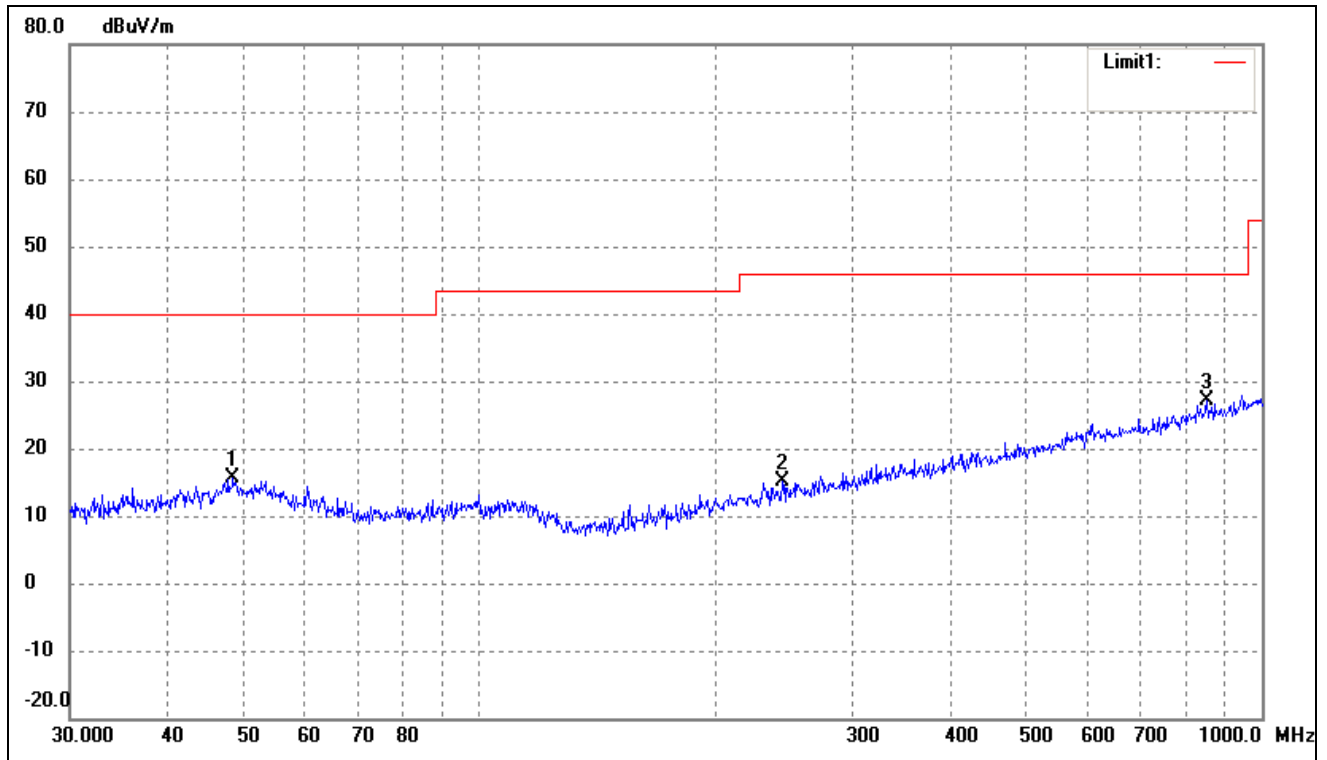


No.	Frequency (MHz)	Reading (dBuV)	Correct dB	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	42.1542	23.92	-9.09	14.83	40.00	-25.17	240	100	peak
2	210.7860	27.06	-10.19	16.87	43.50	-26.63	187	100	peak
3	932.2715	24.94	3.24	28.18	46.00	-17.82	220	100	peak

Operating Condition: Transmitting High Channel (2430MHz)

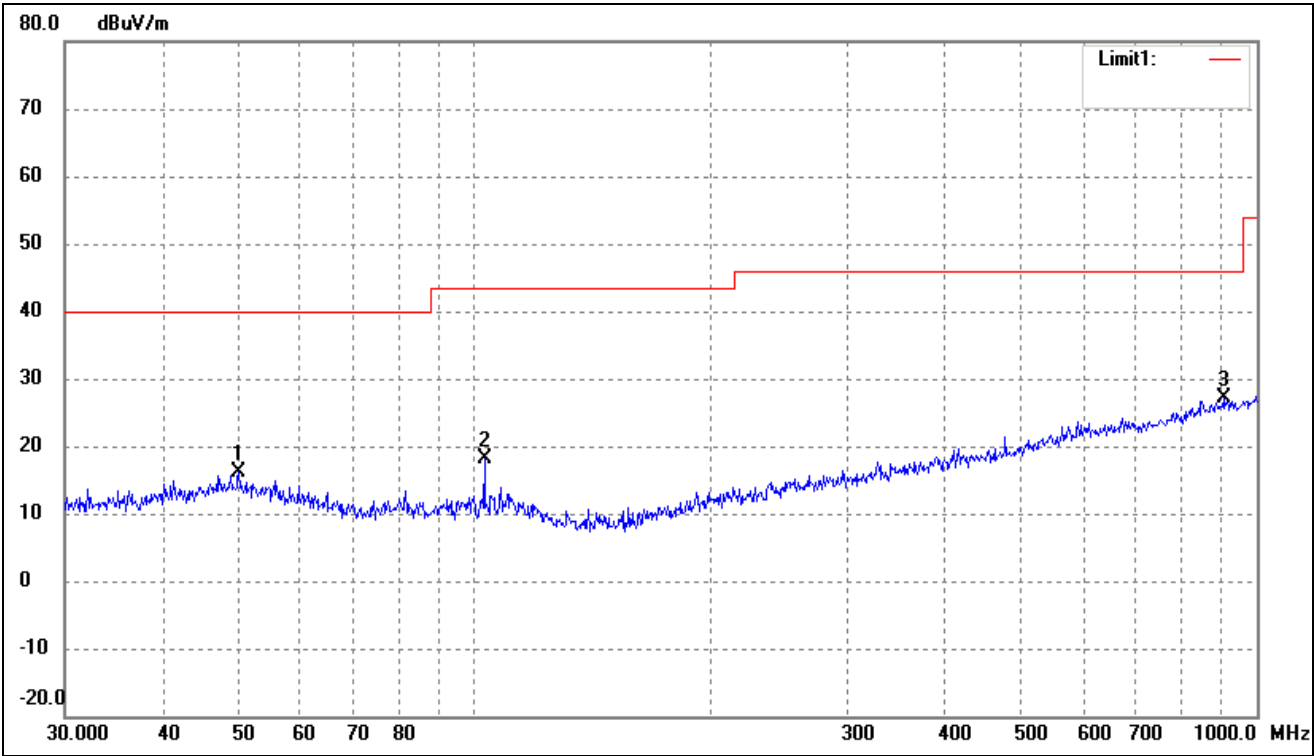
Comment: Battery DC 3.8V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correct dB	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	48.5016	23.89	-8.19	15.70	40.00	-24.30	162	100	peak
2	244.2321	23.79	-8.71	15.08	46.00	-30.92	200	100	peak
3	851.0353	24.72	2.31	27.03	46.00	-18.97	139	100	peak

Test Specification: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV)	dB	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	50.0566	24.07	-7.98	16.09	40.00	-23.91	240	100	peak
2	103.0800	28.78	-10.65	18.13	43.50	-25.37	187	100	peak
3	906.4824	24.08	3.10	27.18	46.00	-18.82	220	100	peak

Spurious Emissions Above 1GHz

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel-2410MHz							
2410	104.73	-3.49	101.24	114	-12.76	H	PK
2410	84.45	-3.48	80.97	94	-13.03	H	AV
4820	51.18	0.57	51.75	74	-22.25	H	PK
4820	37.00	0.57	37.57	54	-16.43	H	AV
7230	34.37	3.68	38.05	74	-35.95	H	PK
7230	20.07	3.68	23.75	54	-30.25	H	AV
9640	43.07	6.74	49.81	74	-24.19	H	PK
9640	27.96	7.15	35.11	54	-18.89	H	AV
12050	54.87	9.28	64.15	74	-9.85	H	PK
12050	33.77	9.28	43.05	54	-10.95	H	AV
2410	107.61	-3.48	104.13	114	-9.87	V	PK
2410	87.33	-3.48	83.85	94	-10.15	V	AV
4820	57.41	0.57	57.98	74	-16.02	V	PK
4820	41.75	0.57	42.32	54	-11.68	V	AV
7230	28.92	3.68	32.60	74	-41.40	V	PK
7230	19.36	3.68	23.04	54	-30.96	V	AV
9640	45.28	6.74	52.02	74	-21.98	V	PK
9640	28.83	6.74	35.57	54	-18.43	V	AV
12050	55.60	9.32	64.92	74	-9.08	V	PK
12050	33.19	9.32	42.51	54	-11.49	V	AV
Middle Channel-2420MHz							
2420	104.23	-3.46	100.77	114	-13.23	H	PK
2420	84.71	-3.46	81.25	94	-12.75	H	AV
4840	55.67	0.59	56.26	74	-17.74	H	PK
4840	39.91	0.59	40.50	54	-13.50	H	AV
7260	29.69	3.71	33.40	74	-40.60	H	PK
7260	19.47	3.71	23.18	54	-30.82	H	AV
9680	45.36	6.79	52.15	74	-21.85	H	PK
9680	28.44	6.85	35.29	54	-18.71	H	AV
12100	51.81	9.28	61.09	74	-12.91	H	PK
12100	30.17	9.28	39.45	54	-14.55	H	AV
2420	106.79	-3.46	103.33	114	-10.67	V	PK
2420	86.52	-3.46	83.06	94	-10.94	V	AV
4840	56.79	0.59	57.38	74	-16.62	V	PK
4840	41.64	0.59	42.23	54	-11.77	V	AV
7260	28.55	3.71	32.26	74	-41.74	V	PK
7260	19.54	3.71	23.25	54	-30.75	V	AV

9680	49.06	6.79	55.85	74	-18.15	V	PK
9680	29.47	6.79	36.26	54	-17.74	V	AV
12100	51.20	9.32	60.52	74	-13.48	V	PK
12100	30.61	9.32	39.93	54	-14.07	V	AV

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel-2430MHz							
2430	107.30	-3.44	103.86	114	-10.14	H	PK
2430	87.51	-3.44	84.07	94	-9.93	H	AV
4860	47.56	0.62	48.18	74	-25.82	H	PK
4860	32.67	0.62	33.29	54	-20.71	H	AV
7290	29.69	3.73	33.42	74	-40.58	H	PK
7290	19.21	3.73	22.94	54	-31.06	H	AV
9720	47.49	6.85	54.34	74	-19.66	H	PK
9720	30.62	6.85	37.47	54	-16.53	H	AV
12150	42.06	9.28	51.34	74	-22.66	H	PK
12150	27.09	9.28	36.37	54	-17.63	H	AV
2430	108.11	-3.44	104.67	114	-9.33	V	PK
2430	88.37	-3.44	84.93	94	-9.07	V	AV
4860	49.40	0.62	50.02	74	-23.98	V	PK
4860	34.79	0.62	35.41	54	-18.59	V	AV
7290	28.27	3.73	32.00	74	-42.00	V	PK
7290	19.33	3.73	23.06	54	-30.94	V	AV
9720	47.60	6.85	54.45	74	-19.55	V	PK
9720	30.93	6.85	37.78	54	-16.22	V	AV
12150	48.38	9.27	57.65	74	-16.35	V	PK
12150	28.02	9.27	37.29	54	-16.71	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 Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2014-05-28	2015-05-27
EMI Test Receiver	R&S	ESVB	825471/005	2014-05-28	2015-05-27
Pre-amplifier	Agilent	8447F	3113A06717	2014-05-28	2015-05-27
Pre-amplifier	Compliance Direction	PAP-0118	24002	2014-05-28	2015-05-27
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2014-05-24	2015-05-23
Horn Antenna	ETS	3117	00086197	2014-05-24	2015-05-23

5.3 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.

5.4 Environmental Conditions

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

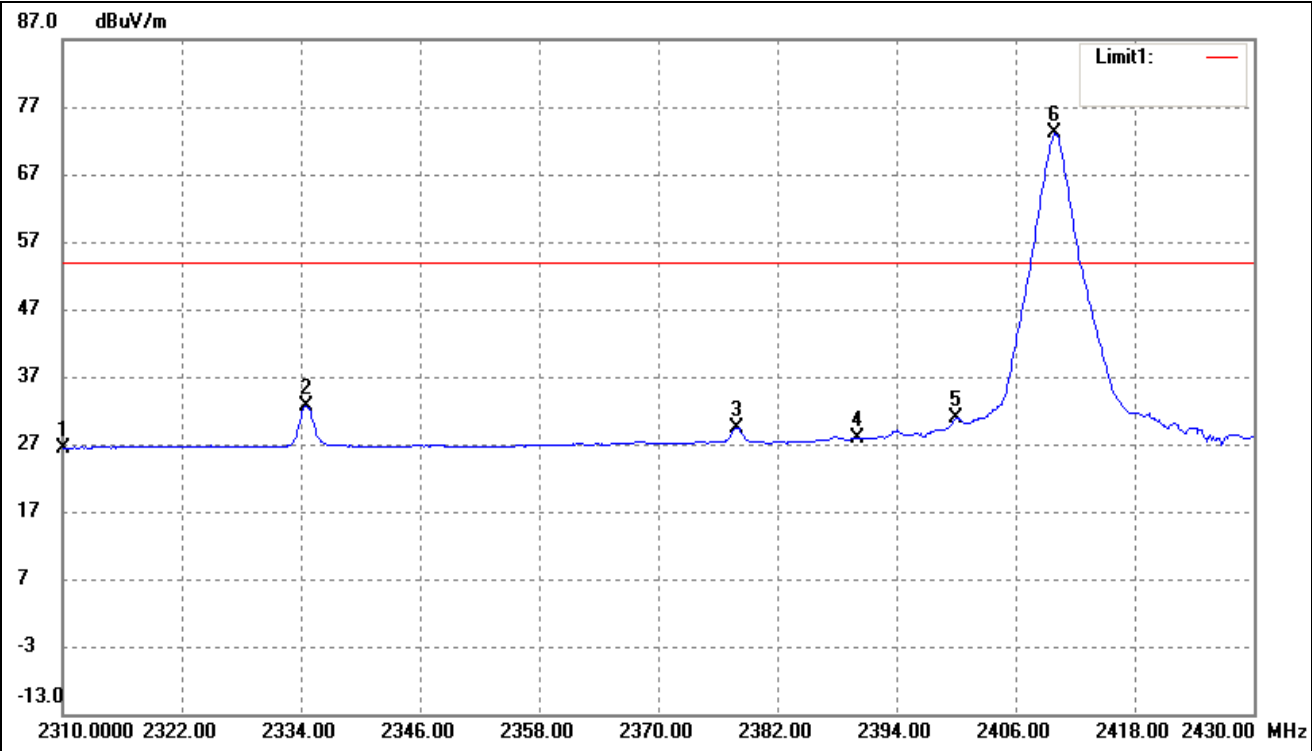
5.5 Summary of Test Results/Plots

Test mode	Frequency	Limit	Result
	MHz	dBuV / dBc	
Lowest	2310.00	<54 dBuV	Pass
	2390.00	<54 dBuV	Pass
	2400.00	>20 dBc	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.

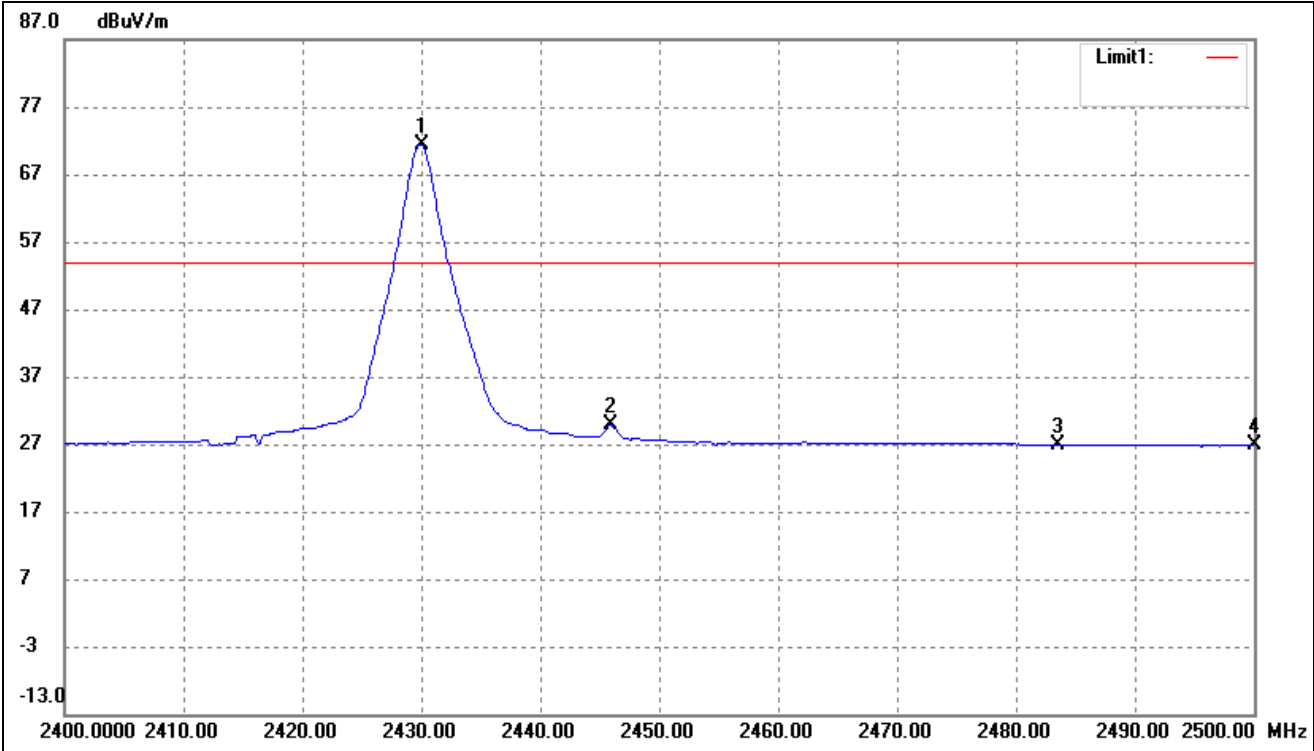
Please refer to the test plots as below.

Lowest Bandedge
Vertical (Worst case)



No.	Frequency (MHz)	Reading (dBuV)	Correct dB	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	30.15	-3.71	26.44	54.00	-27.56	Ave Detector
	2310.000	56.50	-3.71	52.79	74.00	-21.21	Peak Detector
2	2334.600	36.39	-3.66	32.73	54.00	-21.27	Ave Detector
3	2377.920	33.04	-3.57	29.47	54.00	-24.53	Ave Detector
4	2390.000	31.45	-3.54	27.91	54.00	-26.09	Ave Detector
	2390.000	866.77	-3.54	63.23	74.00	10.77	Peak Detector
5	2400.000	34.27	-3.51	30.76	Delta=42.34dBc		Ave Detector
	2409.960	76.58	-3.48	73.10			Ave Detector

Highest Bandedge
Vertical (Worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	dB	(dBuV/m)	(dBuV/m)	(dB)	
1	2430.000	74.91	-3.44	71.47	/	/	/
	2429.900	103.66	-3.44	100.22	/	/	/
2	2445.900	33.21	-3.41	29.80	54.00	-24.20	Ave Detector
3	2483.500	Delta=51.81dBc		19.66	54.00	-34.34	Ave Detector
	2483.500			48.41	74.00	-25.59	Peak Detector
4	2500.000	30.17	-3.28	26.89	54.00	-27.11	Ave Detector
	2500.000	51.19	-3.28	47.91	74.00	-26.09	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 Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2014-05-28	2015-05-27
Attenuator	ATTEN	ATS100-4-20	/	2014-05-28	2015-05-27

6.3 Test Procedure

According to the ANSI 63.4-2009, 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 $\geq$ 1% 20dB Bandwidth, VBW $\geq$ 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.

6.4 Environmental Conditions

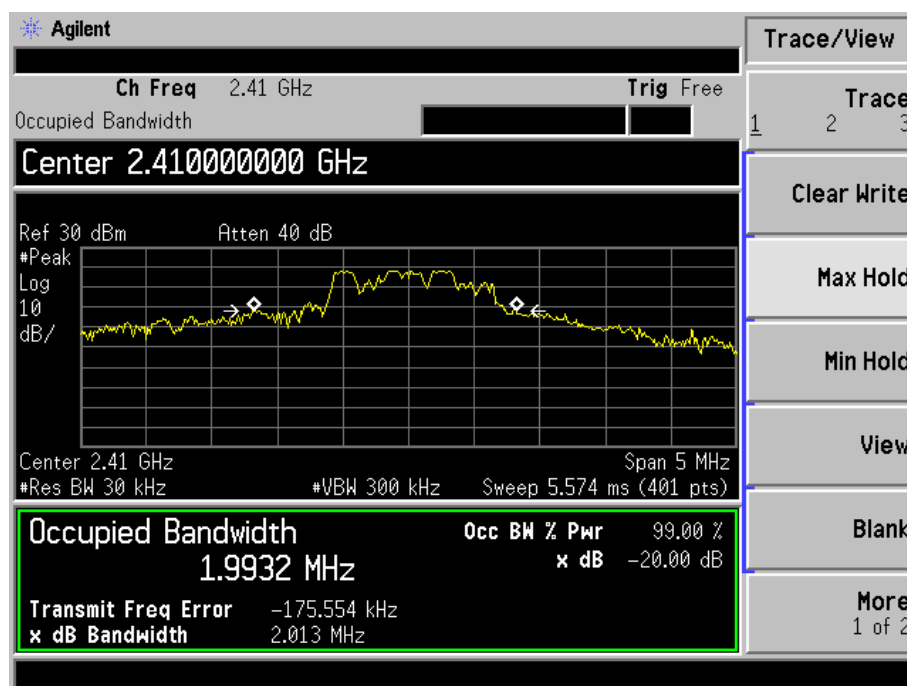
Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

6.5 Summary of Test Results/Plots

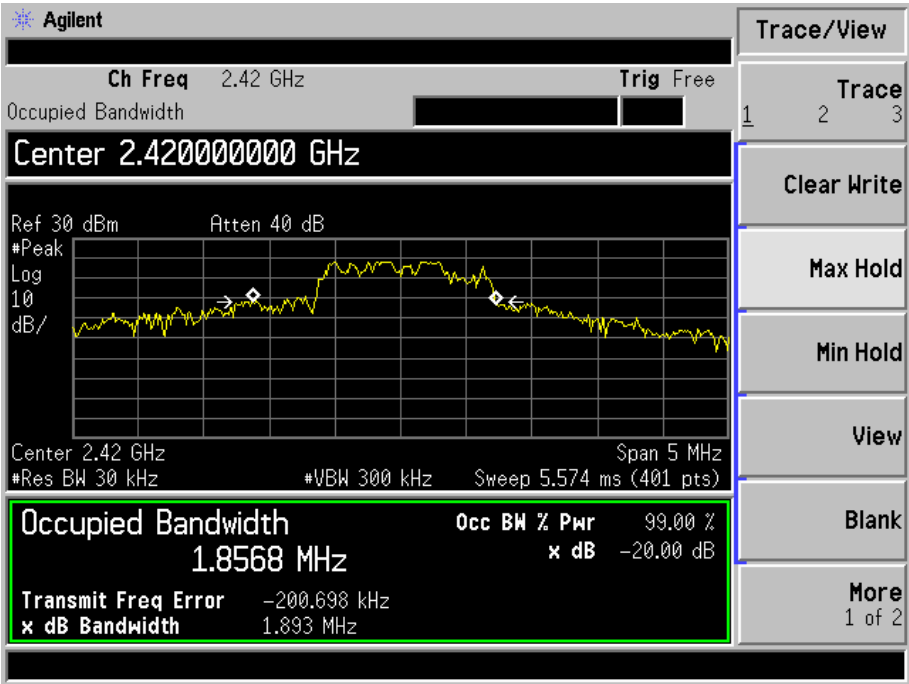
Channel	Frequency MHz	20dB Bandwidth kHz	99% Bandwidth kHz
Low Channel	2410	2013	1993.2
Middle Channel	2420	1893	1856.8
High Channel	2430	1945	1929.8

Please refer to the following test plots

Low Channel:



Middle Channel:



High Channel:



7. Conducted Emissions

7.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ± 2.88 dB.

7.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2014-05-28	2015-05-27
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2014-05-28	2015-05-27
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2014-05-28	2015-05-27

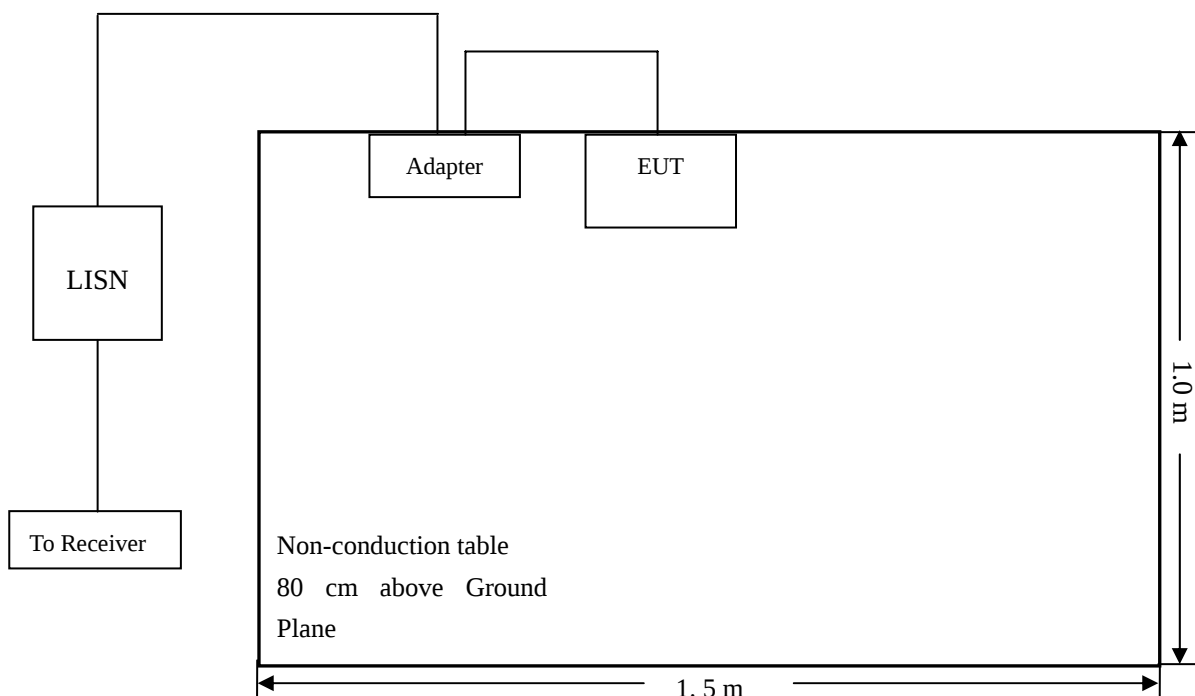
7.3 Test Procedure

The setup of EUT is according with per ANSI C63.4-2009 measurement procedure. The specification used was with the FCC Part 15.207 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.

7.4 Basic Test Setup Block Diagram



7.5 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

7.6 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

Start Frequency 150 kHz
Stop Frequency..... 30 MHz
Sweep Speed Auto
IF Bandwidth..... 10 kHz
Quasi-Peak Adapter Bandwidth 9 kHz
Quasi-Peak Adapter Mode Normal

7.7 Summary of Test Results/Plots

According to the data in section 7.8, the EUT complied with the FCC Part 15.207 Conducted margin for a Class B device, with the *worst* margin reading of:

-22.62 dB at 0.4660 MHz in the Line mode, peak detector, 0.15-30MHz

7.8 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

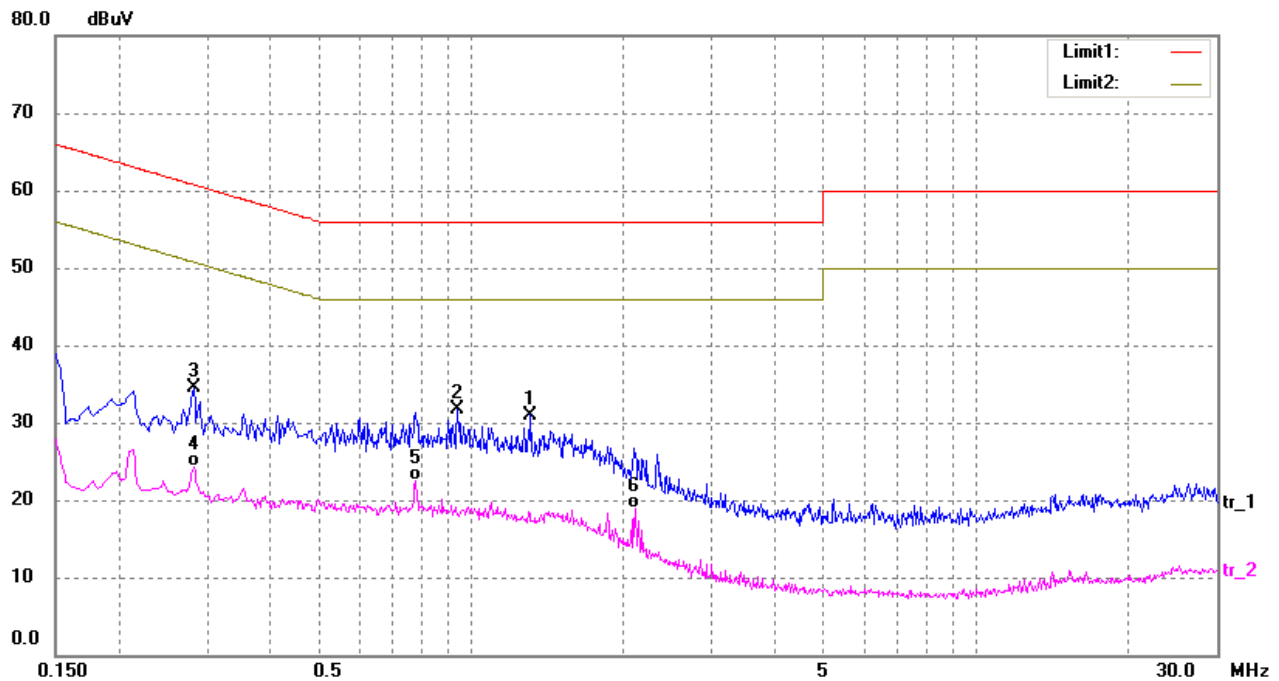
EUT: RadioSecure SLM

Tested Model: RS-SLM-324X

Operating Condition: Transmitting

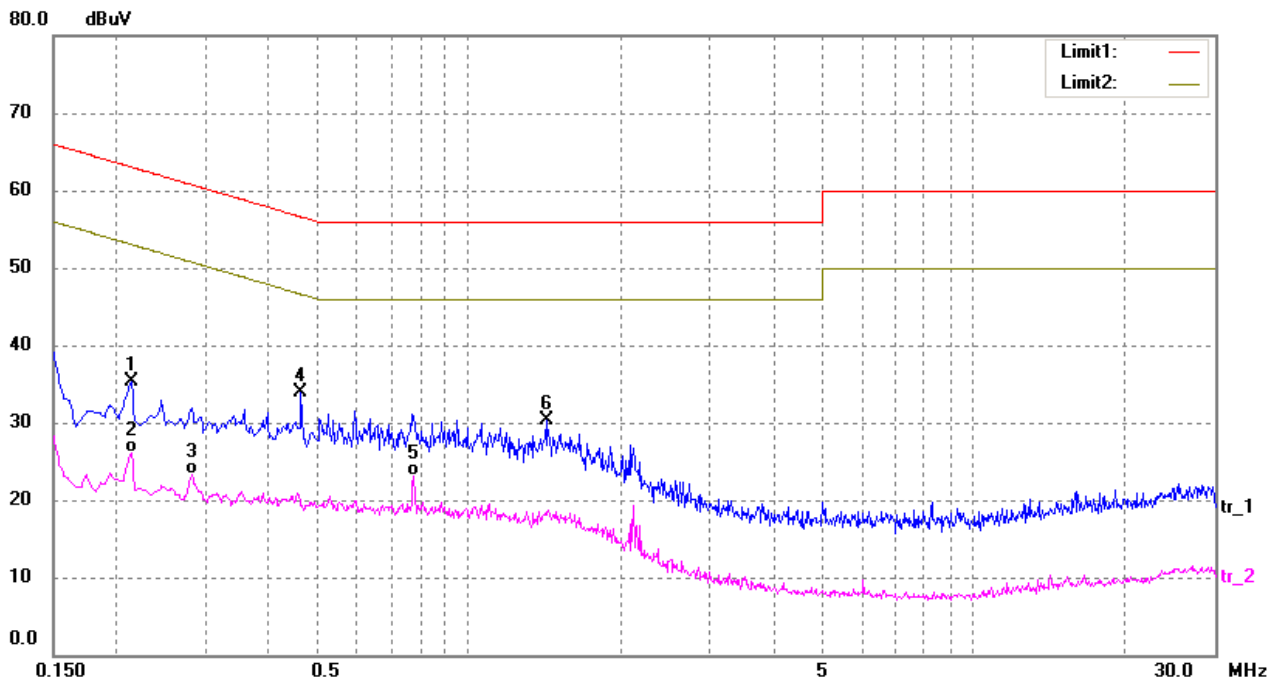
Comment: USB DC 5V

Test Specification: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	1.3140	21.00	10.00	31.00	56.00	-25.00	peak
2	0.9420	21.78	9.94	31.72	56.00	-24.28	peak
3	0.2820	25.00	9.50	34.50	60.76	-26.26	peak
4	0.2820	14.87	9.50	24.37	50.76	-26.39	AVG
5	0.7780	12.74	9.78	22.52	46.00	-23.48	AVG
6	2.1140	8.87	10.00	18.87	46.00	-27.13	AVG

Test Specification: Line



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2140	25.87	9.50	35.37	63.05	-27.68	peak
2	0.2140	16.56	9.50	26.06	53.05	-26.99	AVG
3	0.2820	13.75	9.50	23.25	50.76	-27.51	AVG
4	0.4660	24.46	9.50	33.96	56.58	-22.62	peak
5	0.7780	13.23	9.78	23.01	46.00	-22.99	AVG
6	1.4220	20.39	10.00	30.39	56.00	-25.61	peak

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