

FCC PART 15.249
MEASUREMENT AND TEST REPORT
FOR

ENVOTECH NETWORK SDN BHD

25, Jalan Kilang 2, Kawasan Perindustrian Jelapang, (Taman Pertama), 30100

Jelapang, Ipoh, Perak, Malaysia.

FCC ID: CO8-30076009

Report Concerns: Original Report	Equipment Type: RADIOSECURE SLM
Model:	<u>RS-SLM-324x</u>
Report No.:	<u>STR12038016I-2</u>
Test Date:	<u>2012-03-28 to 2012-04-06</u>
Issue Date:	<u>2012-04-10</u>
Tested By:	<u>Seven Song / Engineer</u> <i>Seven Song</i>
Reviewed By:	<u>Lahm Peng / EMC Manager</u> <i>Lahm peng</i>
Approved & Authorized By:	<u>Jandy so / PSQ Manager</u> <i>Jandyso</i>
Prepared By:	SEM.Test Compliance Service Co., Ltd 3/F, Jinbao Commerce Building, Xin'an Fanshen 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 SEM.Test Compliance Service Co., Ltd.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: ENVOTECH NETWORK SDN BHD
Address of applicant: 25, Jalan Kilang 2, Kawasan Perindustrian Jelapang,
(Taman Pertama), 30100 Jelapang, Ipoh, Perak, Malaysia.

Manufacturer: ENVOTECH NETWORK SDN BHD
Address of manufacturer: 25, Jalan Kilang 2, Kawasan Perindustrian Jelapang,
(Taman Pertama), 30100 Jelapang, Ipoh, Perak, Malaysia.

General Description of E.U.T

Items	Description
EUT Description:	RADIOSECURE SLM
Trade Name:	E-SEAL
Model No.:	RS-SLM-324x
Rated Voltage:	Battery DC 3.7V, Charging: DC 5V
Rated Current:	10-380mA
Frequency Range:	2410MHz
No. of Channel:	1
Antenna Type:	Integral Antenna
Device Category:	Mobile Device
For more information refer to the circuit diagram form and the user's manual.	

The test data is gathered from a production sample, provided by the manufacturer.

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 C63.4-2003, 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.

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted according to the Operating Instructions and let the EUT keep transmitting.

1.4 Test Facility

- **FCC – Registration No.: 994117**

SEM.Test Compliance Services 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 994117.

- **Industry Canada (IC) Registration No.: 7673A**

The 3m Semi-anechoic chamber of SEM.Test Compliance Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 7673A.

- **CNAS Registration No.: L4062**

Shenzhen SEM.Test Electronics Service 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 3/F, Jinbao Commerce Building, Xin'an Fanshen Road, Bao'an District, Shenzhen, P.R.C (518101)

1.5 EUT Exercise Software

The EUT exercise program used during the testing was designed to exercise the system components. The test software is started while the whole system is on.

1.6 Accessories Equipment List and Details

Description	Manufacturer	Model	Serial Number
Adapter	Verykool	ASUC30a-050050	/
/	/	/	/

1.7 EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
DC Power Cable	0.8	Unshielded	Without Core
/	/	/	/

2. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§15.207 (a)	Conducted Emission	Compliant
§15.205	Restricted Band of Operation	Compliant
§15.209	Radiated Emission	Compliant
§15.249(a)	Field Strength	Compliant
§15.249(d)	Out of Band Emission	Compliant

3. §15.203 - ANTENNA REQUIREMENT

3.1 Standard Applicable

According to FCC 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. §15.205, §15.209, §15.249 (a)- RADIATED EMISSION

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 fundamental (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	2012-03-28	2013-03-27
EMI Test Receiver	R&S	ESVB	825471/005	2012-03-28	2013-03-27
Pre-amplifier	Agilent	8447F	3113A06717	2012-03-28	2013-03-27
Pre-amplifier	Compliance Direction	PAP-0118	24002	2012-03-28	2013-03-27
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2012-02-25	2013-02-24
Horn Antenna	ETS	3117	00086197	2012-02-25	2013-02-24
Loop Antenna	SCHWARZECK	HFRA 5165	9365	2012-02-25	2013-02-24

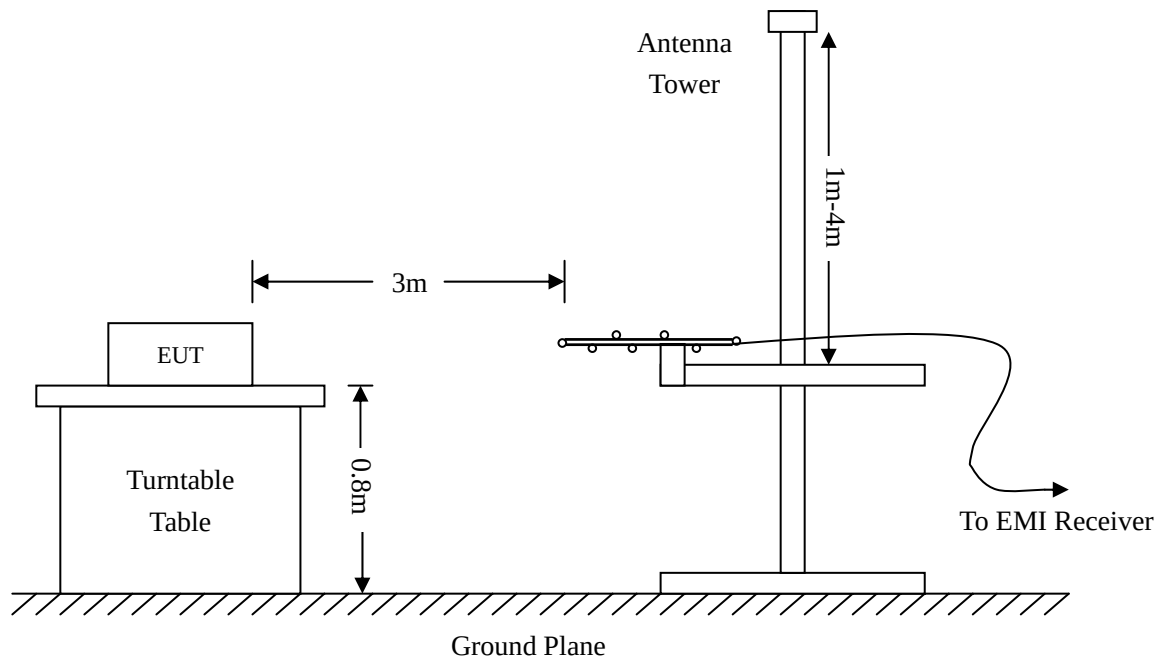
Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

4.4 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 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.



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 for Class B. The equation for margin calculation is as follows:

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

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:

-6.8 dB μ V at 4820.0 MHz in the Vertical polarization, Transmitting Mode, 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 Radiation Emissions Test

Radiated Disturbance

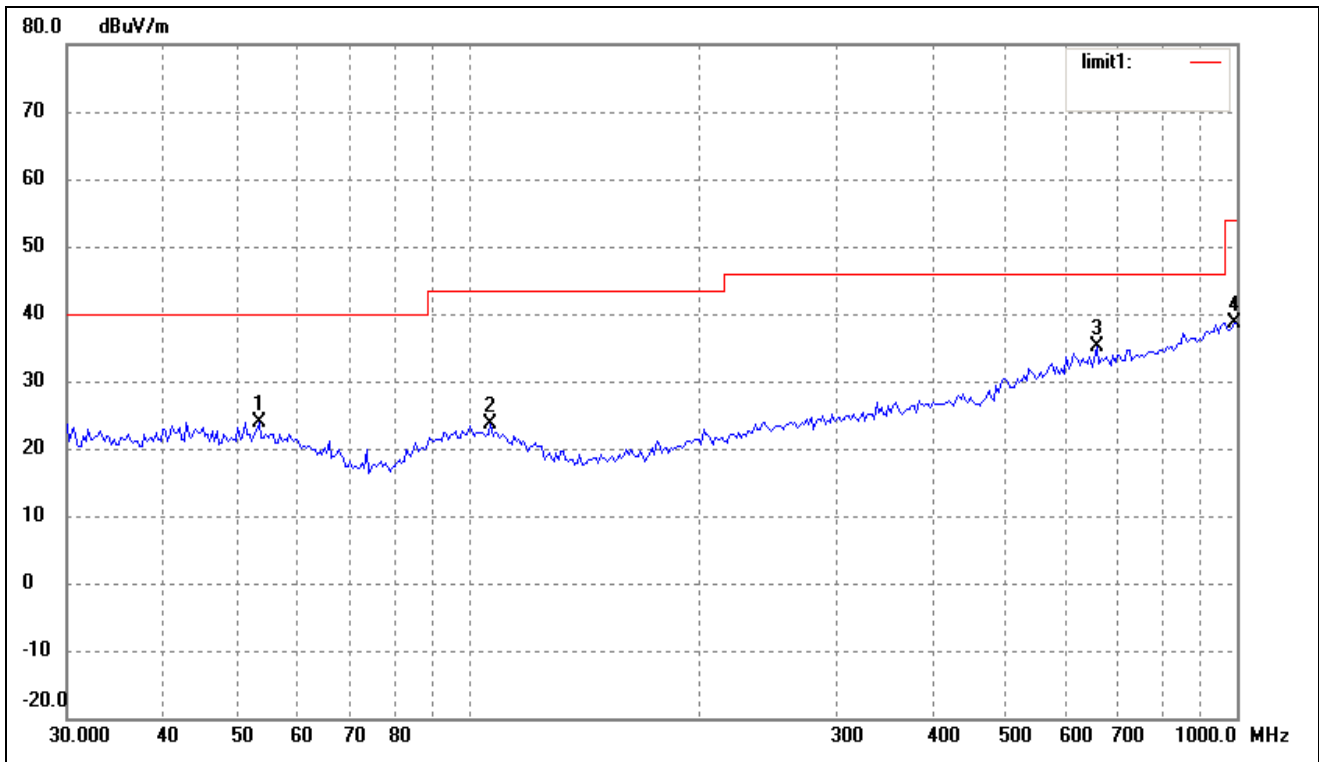
EUT: RADIOSECURE SLM

M/N: RS-SLM-324x

Operating Condition: Charging

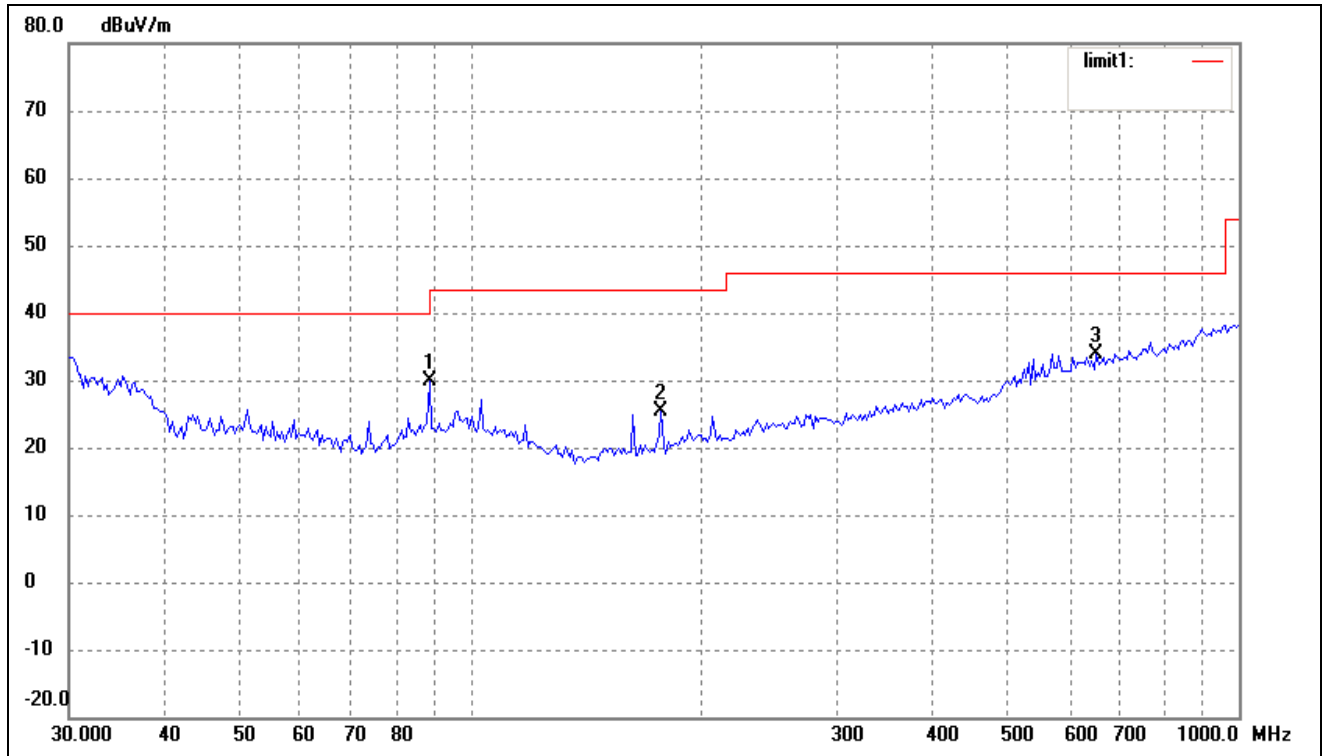
Test Specification: Horizontal & Vertical

Horizontal:

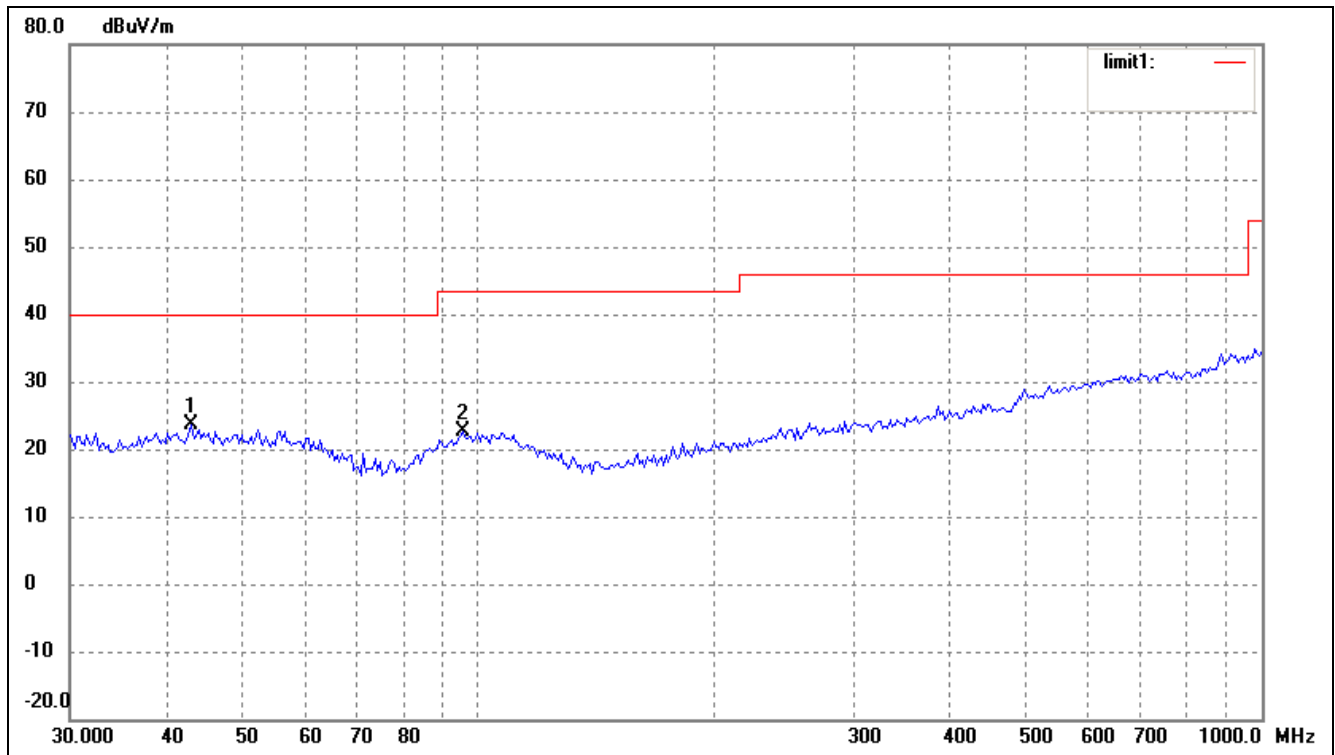


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	53.3179	16.15	7.84	23.99	40.00	-16.01	360	100	peak
2	106.7587	15.82	7.86	23.68	43.50	-19.82	224	100	peak
3	656.5300	17.96	17.14	35.10	46.00	-10.90	165	100	peak
4	993.0114	16.07	22.61	38.68	54.00	-15.32	110	100	peak

Vertical:

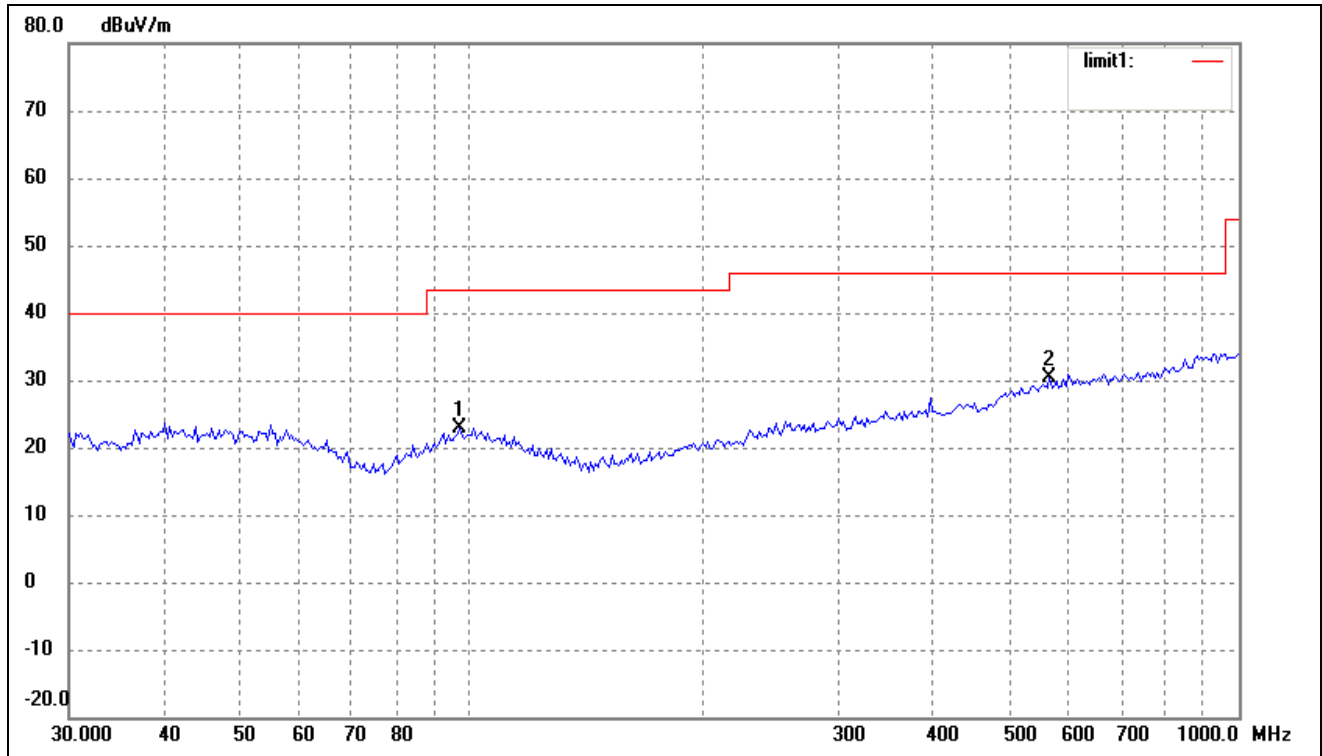


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	88.3421	23.44	6.54	29.98	43.50	-13.52	64	100	peak
2	176.8878	19.97	5.41	25.38	43.50	-18.12	267	100	peak
3	651.9417	16.79	17.11	33.90	46.00	-12.10	115	100	peak

Plot of Radiation Emissions Test*Radiated Disturbance**EUT: RADIOSECURE SLM**M/N: RS-SLM-324x**Operating Condition: Transmitting below 1GHz**Test Specification: Horizontal & Vertical**Horizontal:*

No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	42.8998	15.78	7.97	23.75	40.00	-16.25	145	100	peak
2	95.4270	15.02	7.50	22.52	43.50	-20.98	96	100	peak

Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	96.7749	15.30	7.59	22.89	43.50	-20.61	315	100	peak
2	566.6223	16.60	13.76	30.36	46.00	-15.64	76	100	peak

Spurious Emission Above 1GHz

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
2410.0	AV	80.8	187	V	29.1	3.7	34.0	79.6	94	-14.4
2410.0	AV	77.6	148	H	29.1	3.7	34.0	76.4	94	-17.6
2410.0	PK	91.5	335	V	29.1	3.7	34.0	90.3	114	-23.7
2410.0	PK	88.7	145	H	29.1	3.7	34.0	87.5	114	-26.5
4820.0	AV	40.9	219	V	34.1	5.2	33.0	47.2	54	-6.8
4820.0	AV	39.1	357	H	34.1	5.2	33.0	45.4	54	-8.6
4820.0	PK	49.9	119	V	34.1	5.2	33.0	56.2	74	-17.8
4820.0	PK	47.7	161	H	34.1	5.2	33.0	54.0	74	-20.0
7230.0	AV	35.3	305	V	37.4	6.1	33.5	45.3	54	-8.7
7230.0	AV	32.6	326	H	37.4	6.1	33.5	42.6	54	-11.4
7230.0	PK	43.5	105	V	37.4	6.1	33.5	53.5	74	-20.5
7230.0	PK	41.6	127	H	37.4	6.1	33.5	51.6	74	-22.4

*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. §15.249(b) 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	2012-03-28	2013-03-27
EMI Test Receiver	R&S	ESVB	825471/005	2012-03-28	2013-03-27
Positioning Controller	C&C	CC-C-1F	N/A	2012-03-28	2013-03-27
RF Switch	EM	EMSW18	SW060023	2012-03-28	2013-03-27
Pre-amplifier	Agilent	8447F	3113A06717	2012-03-28	2013-03-27
Pre-amplifier	Compliance Direction	PAP-0118	24002	2012-03-28	2013-03-27
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2012-02-25	2013-02-24
Horn Antenna	ETS	3117	00086197	2012-02-25	2013-02-24

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

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

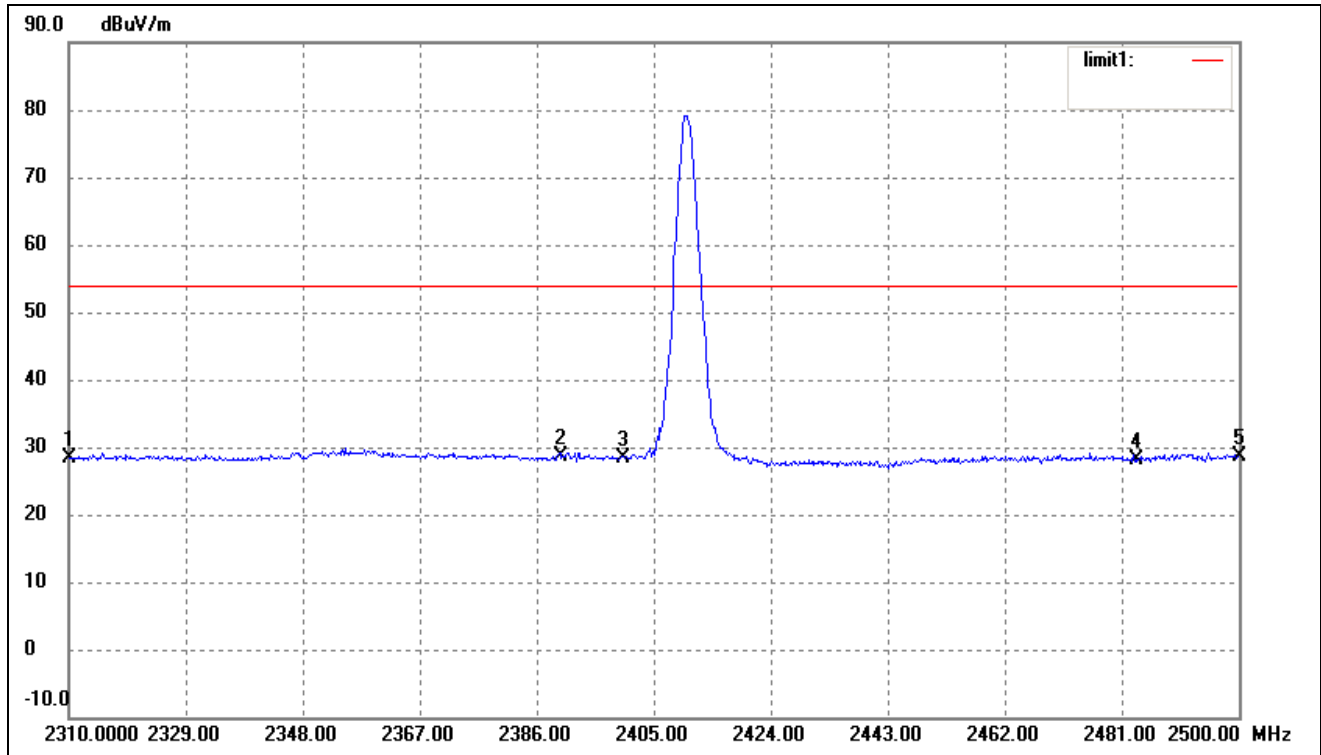
Temperature:	24 °C
Relative Humidity:	60 %
ATM Pressure:	1012 mbar

5.5 Summary of Test Results/Plots

Frequency MHz	Limit dBuV	Result
2310.000	<54	Pass
2390.000	<54	Pass
2400.000	<54	Pass
2483.500	<54	Pass
2500.000	<54	Pass

The edge emissions are below the FCC 15.209 Limits. Please refer to the test plots below.

Lowest Bandedge



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	36.01	-7.51	28.50	54	-25.5	Ave Detector
	2310.000	42.30	-7.51	34.79	74	-39.21	Peak Detector
2	2390.000	35.85	-7.34	28.51	54	-25.49	Ave Detector
	2390.000	46.12	-7.34	38.78	74	-35.22	Peak Detector
3	2400.000	35.74	-7.31	28.43	54	-25.57	Ave Detector
	2400.000	45.64	-7.31	38.33	74	-35.67	Peak Detector
4	2483.500	28.16	-7.42	20.74	54	-33.26	Ave Detector
	2483.500	39.20	-7.42	31.78	74	-42.22	Peak Detector
5	2500.000	28.53	-7.51	21.02	54	-32.98	Ave Detector
	2500.000	37.87	-7.51	30.36	74	-43.64	Peak Detector

6. §15.207 (a)- CONDUCTED EMISSION

6.1 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.

6.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2012-03-28	2013-03-27
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2012-03-28	2013-03-27
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2012-03-28	2013-03-27

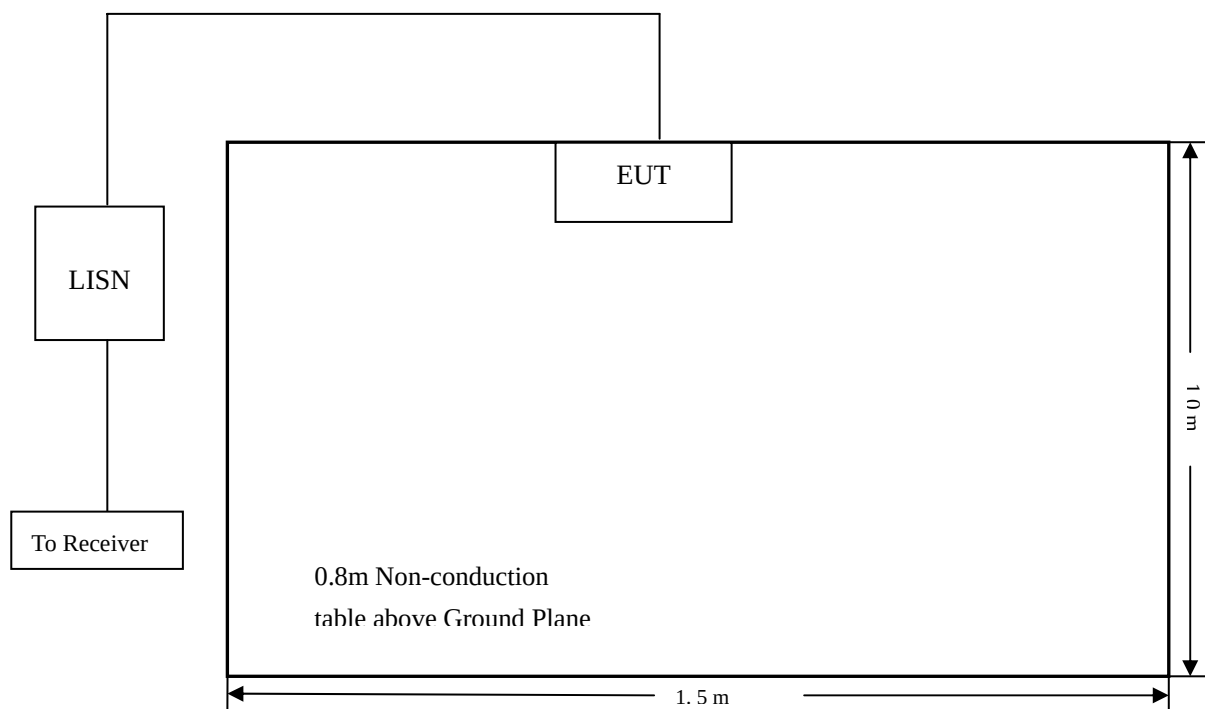
6.3 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 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.

6.4 Basic Test Setup Block Diagram



6.5 Environmental Conditions

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

6.6 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

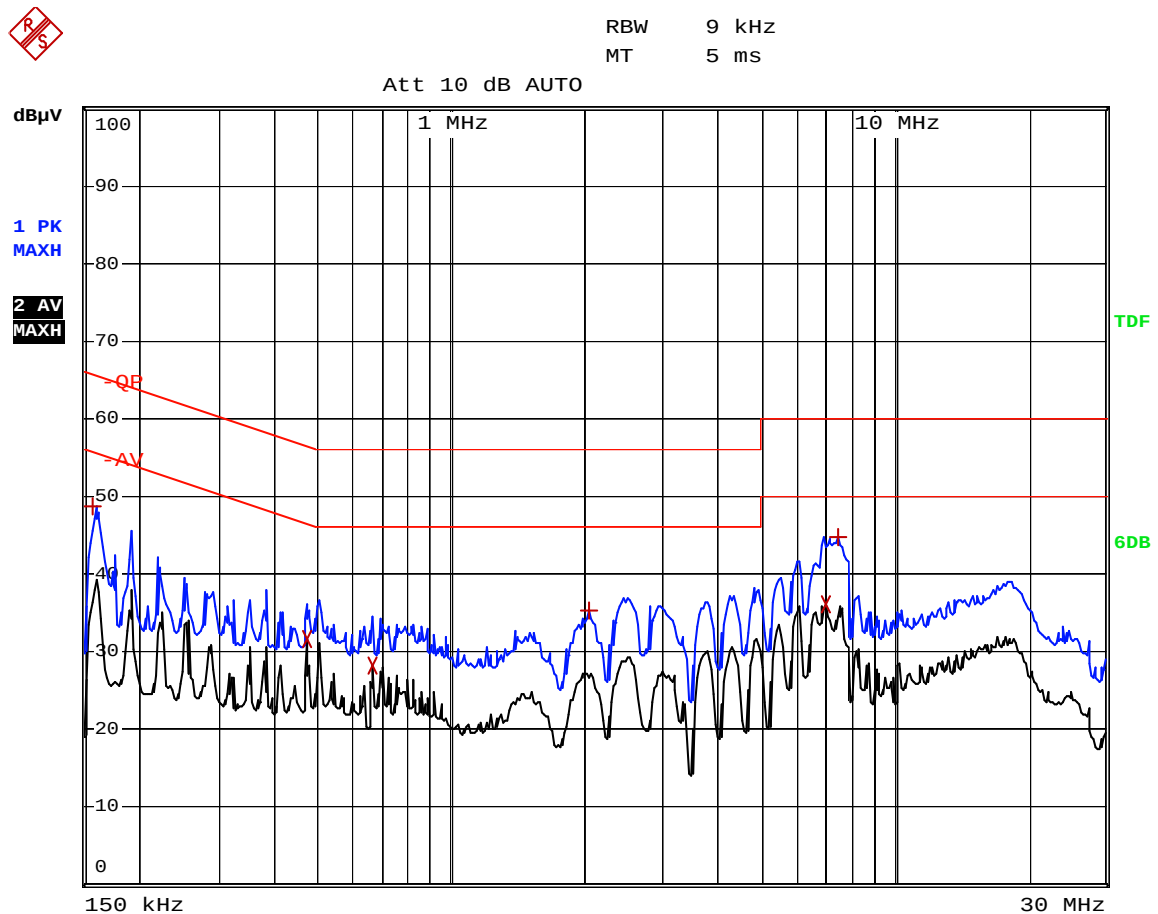
6.7 Summary of Test Results/Plots

According to the data in section 3.8, the EUT complied with the FCC 15.207 Conducted margin for a Class B device, with the *worst* margin reading of:

-12.59 dB μ V at 0.470 MHz in the Line mode, Average detector, 0.15-30MHz

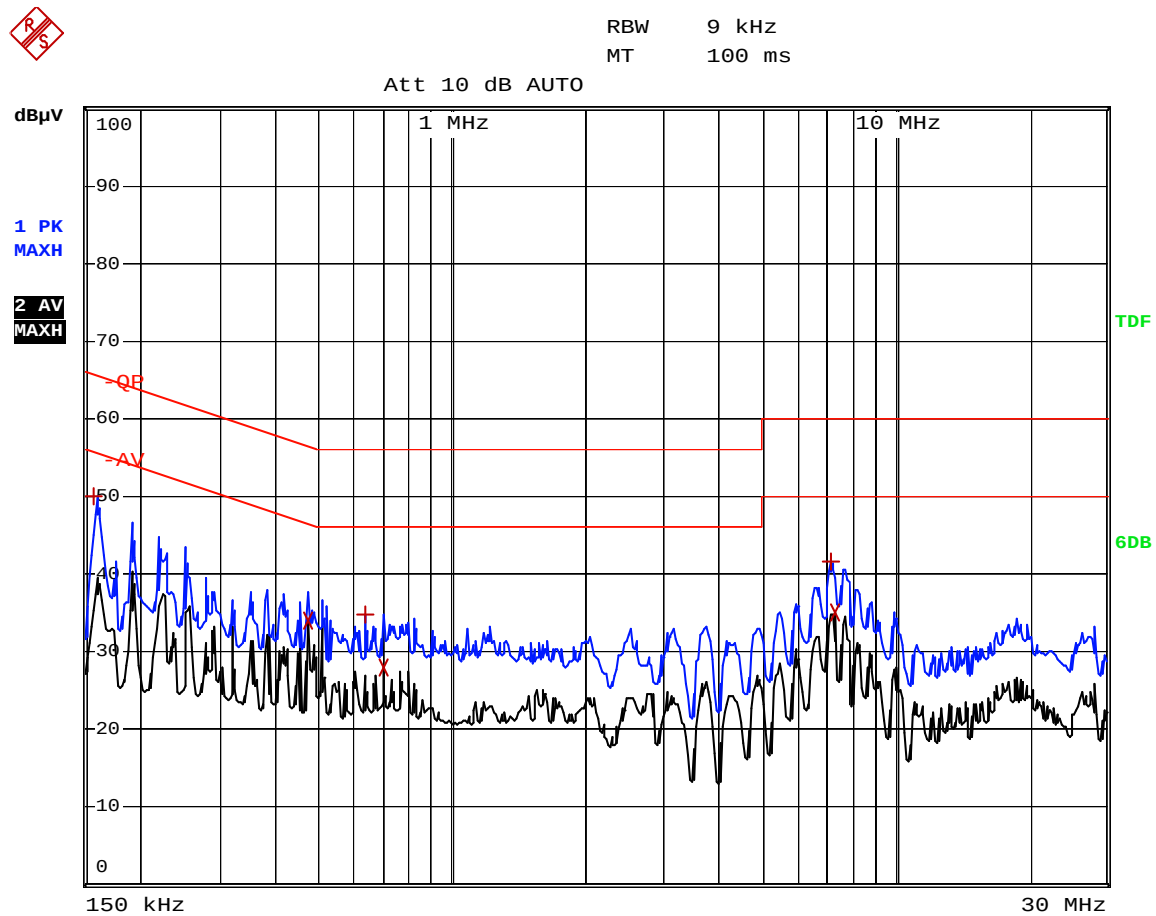
6.8 Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC PART 15.207	
Frequency	Amplitude	Detector	Phase	Limit	Margin
MHz	dB μ V	QP/Ave/Pk	Line/Neutral	dB μ V	dB
0.470	33.92	Ave	Line	46.51	-12.59
7.006	36.03	Ave	Neutral	50.00	-13.97
0.474	31.50	Ave	Neutral	46.44	-14.94
7.306	34.99	Ave	Line	50.00	-15.01
7.474	44.72	Pk	Neutral	60.00	-15.28
0.158	50.08	Pk	Line	65.57	-15.49
0.158	48.68	Pk	Neutral	65.57	-16.89
0.666	28.33	Ave	Neutral	46.00	-17.67
0.702	28.03	Ave	Line	46.00	-17.97
7.162	41.56	Pk	Line	60.00	-18.44
2.046	35.34	Pk	Neutral	56.00	-20.66
0.638	34.75	Pk	Line	56.00	-21.25

Plot of Conducted Emissions Test Data*Conducted Disturbance**EUT: RADIOSECURE SLM**M/N: RS-SLM-324x**Operating Condition: Charging**Test Specification: N**Comment: AC 120V/60Hz DC 5V*

Plot of Conducted Emissions Test Data

Conducted Disturbance
EUT: RADIOSECURE SLM
M/N: RS-SLM-324x
Operating Condition: Charging
Test Specification: L
Comment: AC 120V/60Hz DC 5V



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