

FCC Part 15.209

Measurement And Test Report For

Senstech Sdn. Bhd.

Suite 10-01,Level 10, Menara Atlan, 161B Jalan Ampang, 50450 Kuala Lumpur, Malaysia

FCC ID: Z9I-MD-H01

Nov 26, 2011

This Report Concerns: <input checked="" type="checkbox"/> Original Report	Equipment Type: MM chip dedicated reader writer module
Report Number:	MTI111102002RF
Test Engineer:	Bill Chen <i>Bill Chen</i>
Reviewed By:	Jason Zheng <i>Jason Zheng</i>
Approved & Authorized By:	Hebe Lee <i>Hebe Lee</i>
Test Date:	Nov 4 - 25,2011
Prepared By:	MTI Technology Laboratory Ltd. 10F, Yinxing Business Hotel, Xixiang Road, Bao'an District, Shenzhen, P.R.China. Tel: +86-755-8885 0135 Fax: +86-755-8885 0136

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of MTI Technology Laboratory Ltd.

TABLE OF CONTENTS

1. GENERAL INFORMATION	3
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
1.2 RELATED SUBMITTAL(S) / GRANT (S)	3
1.3 TEST METHODOLOGY	3
1.4 TEST FACILITY	4
2. SYSTEM TEST CONFIGURATION	5
2.1 EUT CONFIGURATION	5
2.2 EUT EXERCISE	5
2.3 GENERAL TEST PROCEDURES	5
2.4 LIST OF MEASURING EQUIPMENTS USED	6
3. SUMMARY OF TEST RESULTS	7
4. RADIATED EMISSION	8
4.1 LIMITS OF RADIATED EMISSION MEASUREMENT	8
4.2 EUT SETUP	8
4.3 TEST EQUIPMENT LIST AND DETAILS	8
4.4 TEST PROCEDURE	9
4.5 TEST RESULT	9

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Applicant:	Senstech Sdn. Bhd.
Address of applicant:	Suite 10-01, Level 10, Menara Atlan, 161B Jalan Ampang, 50450 Kuala Lumpur, Malaysia
Manufacturer:	FEC Inc
Address of manufacturer:	1414 Higashi, Utsugi machi, Kanazawa shi, Ishikawa, 920-0377, Japan
Equipment Under Test:	MM chip dedicated reader writer module
Tested Model No.:	MMRW-MD-H01
Trade Name:	/
Supplementary Models No:	/
	Remark: supplementary models are only different in exterior with tested Model and with the same circuit construction
Frequency range:	13.56 MHz
Type of Modulation:	ASK
Number of Channels:	1
Antenna Type:	Integral Antenna
Power Supply:	DC 5V

Remark: * The test data gathered are from the production sample provided by the manufacturer.

1.2 Related Submittal(s) / Grant (s)

This submittal(s) is a test report based on the Electromagnetic Interference (EMI) tests performed on the EUT. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4 - 2003.

The tests were performed in order to determine compliance with FCC Part 15, Subpart B, and section 15.205, and 15.209 rules.

1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in 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. Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 Test Facility

All measurement required was performed at laboratory of NTEK Testing Technology Co., Ltd., at 1/F, Building E, Fenda Science Park Sanwei Community, Xixiang Street, Baoan District , Shenzhen,Guangdong

The test facility is recognized, certified, or accredited by the following organizations:

FCC – Registration No.: 238937

NTEK Testing 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. Registration 238937.

2. SYSTEM TEST CONFIGURATION

The tests documented in this report were performed in accordance with ANSI C63.4-2003 and FCC CFR 47 Part 15 Subpart C.

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The calibrated antennas used to sample the radiated field strength are mounted on a non-conductive, motorized antenna mast 3 or 10 meters from the leading edge of the turntable.

2.3 General Test Procedures

Conducted Emissions The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 7.1 of ANSI C63.4-2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak detector mode.

Radiated Emissions The EUT is placed on a turntable, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4-2003.

2.4 List of Measuring Equipments Used

Items	Equipment	Manufacturer	Model No.	Serial No.	Last Cal	Calibration Period
1	EMI Test Receiver	ROHDE & SCHWARZ	ESI 26	100079	2011/11	1 year
3	3m Semi- Anechoic Chamber	ETS	N/A	N/A	2011/11	1 year
1	EMI Test Receiver	ROHDE & SCHWARZ	ESCS30	100038	2011/11	1 year
2	EMI Test Receiver	ROHDE & SCHWARZ	ESI 26	100009	2011/11	1 year
3	Receiver/ Spectrum Analyzer	ROHDE & SCHWARZ	ESCI	100106	2011/11	1 year
4	Spectrum Analyzer	Agilent	E7405A	US41160415	2011/11	1 year
5	Artificial Mains	ROHDE & SCHWARZ	ESH2-Z5	100028	2011/11	1 year
6	Pulse Limiter	ROHDE & SCHWARZ	ESHSZ2	100044	2011/11	1 year
7	LISN	COM Power	LI-200	12212	2011/11	1 year
8	LISN	COM Power	LI-200	12019	2011/11	1 year
9	3m/5m Semi- Anechoic Chamber	ETS	N/A	N/A	2011/11	1 year
10	Ultra-Broadband Antenna	R/S	HL562	100015	2011/11	1 year
11	Turntable	ETS	2088	2149	N/A	N/A
12	Antenna Mast	ETS	2075	2346	N/A	N/A
13	Loop Antenna	SCHWARZBECK	HFRA 5150	9453	2011/11	1 year

3. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
15.207	Conducted Emission	N/A
15.209	Radiated Emission	Pass

4. RADIATED EMISSION

4.1 Limits of Radiated Emission Measurement

According to § 15.205 15.209(a) & 15.35 (b), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Section 15.209:

0.009–0.490 2400/F (kHz) uV/m @300m

0.490–1.705 24000/F (kHz) uV/m @30m

1.705–30.0 30 uV/m @30m

30 - 88 MHz 40 dBuV/m @3M

88 -216 MHz 43.5 dBuV/m @3M

216 -960 MHz 46 dBuV/m @3M

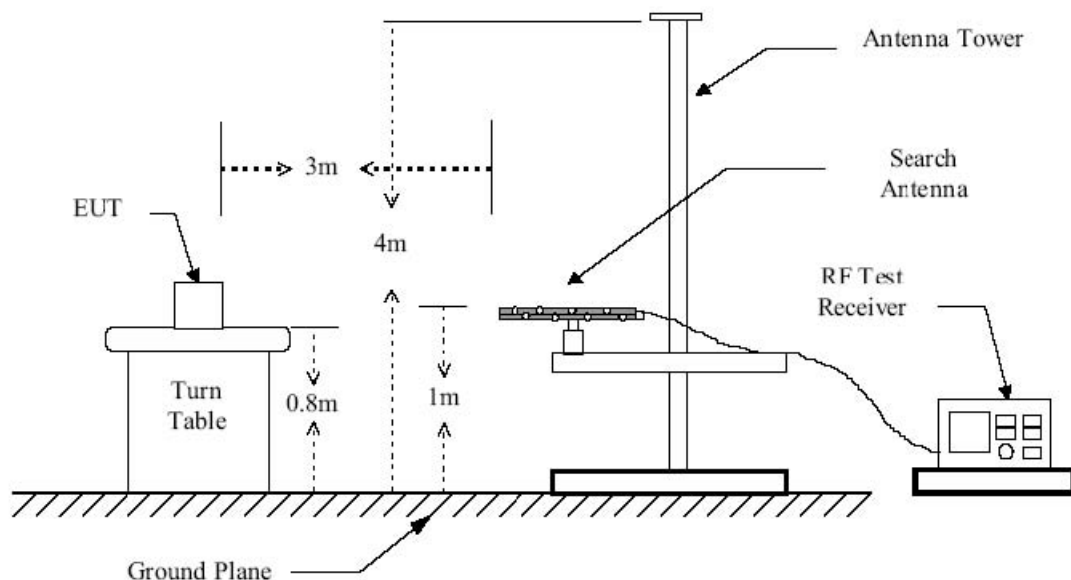
Above 960 MHz 54dBuV/m @3M

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.

Emissions that fall in the restricted bands (15.205) must be less than 54dBuV/m otherwise the spurious and harmonics must be attenuated by at least 20dB.

4.2 EUT Setup

Radiated Measurement Setup



4.3 Test Equipment List and Details

See section 2.4.

4.4 Test Procedure

1. 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.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using the quasi-peak method or average method as specified and then reported in Data sheet peak mode and QP mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.

4.5 Test Result

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

-0.20 dB μ V at 866.0879 MHz in the Vertical polarization 9 kHz to 1 GHz, 3Meters

Plot of Radiation Emissions Test

Test mode: Transmitting below 30 MHz

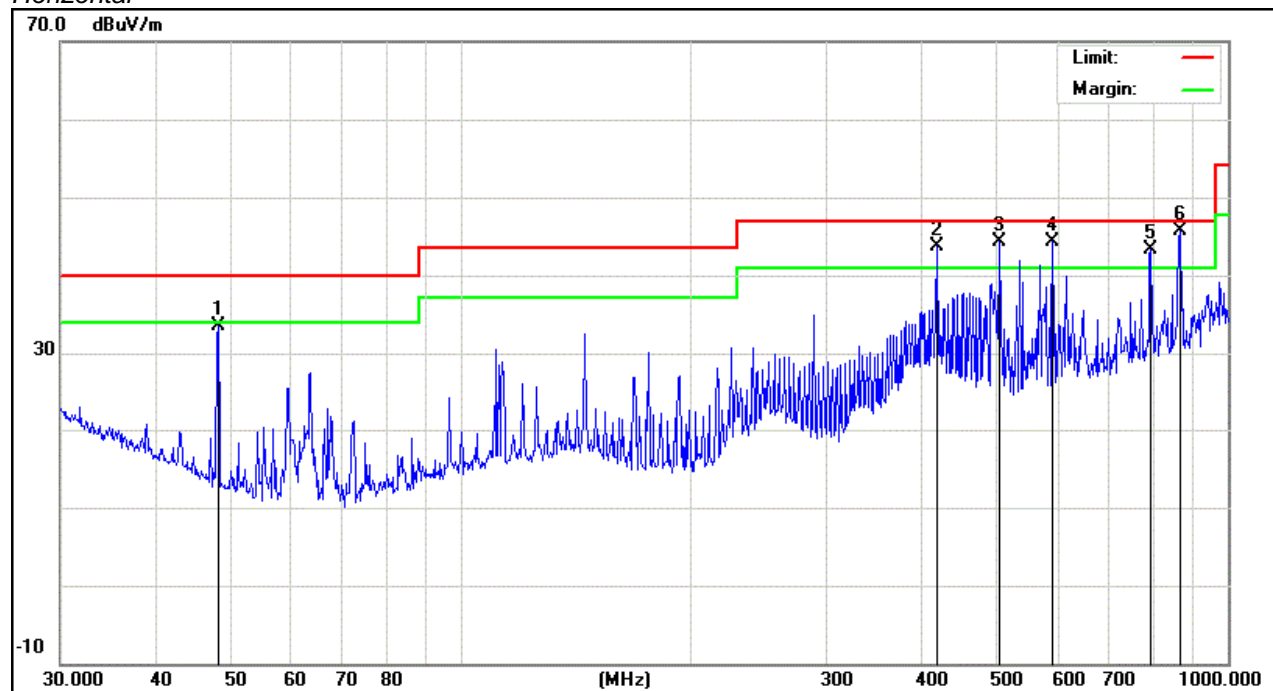
No.	Frequency (MHz)	Reading (dB μ V/m)	Correct dB/m	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	0.0351	16.40	20.05	36.45	76.62	-40.17	41	100	peak
2	0.1550	41.28	20.11	61.39	63.80	-2.41	124	100	peak
3	0.2500	20.03	20.13	40.16	59.65	-19.49	331	100	peak
4	13.560	20.99	25.36	46.35	49.54	-3.19	0	100	Fun.

Remark: Radiation Emission Test (Below 30MHz) is tested in SEM Test Compliance Service Co., Ltd.

Plot of Radiation Emissions Test

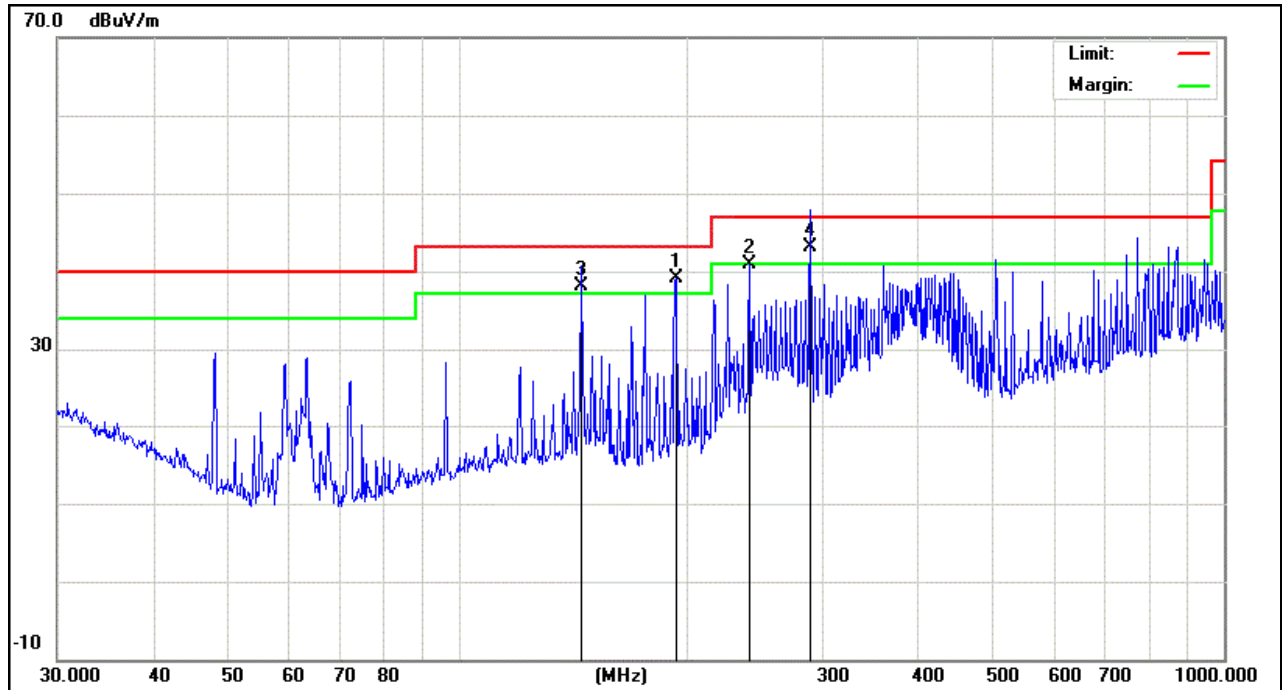
Test mode: Transmitting from 30 MHz to 1 GHz

Horizontal



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
		MHz	Level	Factor	ment			Detector
			dBuV	dB	dBuV/m	dBuV/m	dB	
1	*	193.0945	30.47	8.71	39.18	40.00	-0.82	peak
2		240.8304	29.38	11.52	40.90	46.00	-5.10	peak
3	!	144.3348	26.18	11.92	38.10	43.50	-5.40	QP
4	!	289.0021	29.31	13.89	43.20	46.00	-2.80	QP

Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		48.1626	24.40	9.05	33.45	40.00	-6.55	peak
2	!	417.6411	25.88	17.87	43.75	46.00	-2.25	peak
3	!	504.7062	24.82	19.43	44.25	46.00	-1.75	peak
4	!	590.9737	23.51	20.79	44.30	46.00	-1.70	peak
5	!	793.3960	19.44	23.91	43.35	46.00	-2.65	peak
6	*	866.0879	20.42	25.38	45.80	46.00	-0.20	peak