FCC TEST REPORT
for
Shandong Mingwah Aohan Smart Tech Co., Ltd.

HF RFID Reader and Writer

Model No.: HY-100, HY-30, HY-6540TP,
HY-U22H, HY-U32H, HY-U42H, HY-87D

Prepared for	:	Shandong Mingwah Aohan Smart Tech Co., Ltd.
Address	:	3-1005-1, Yinhe Building, 2008 Xinluo St., High-Tech District, Jinan, Shandong, China

Prepared By	:	Shenzhen Anbotek Compliance Laboratory Limited
Address	:	1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China Tel: (86) 755-26066544 Fax: (86) 755-26014772

Report Number	:	201308673F
Date of Test	:	Aug. 14~ Aug. 20, 2013
Date of Report	:	Aug. 21, 2013

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TEST REPORT VERIFICATION

Applicant	:	Shandong Mingwah Aohan Smart Tech Co., Ltd.
Manufacturer	:	Jinan H-RFID Information Technology Co., Ltd.
EUT	:	HF RFID Reader and Writer
Model No.	:	HY-100, HY-30, HY-6540TP, HY-U22H, HY-U32H, HY-U42H, HY-87D
Rating	:	DC 5V, 150mA Max. Via PC
Trade Mark	:	N.A.

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C 15.225 & FCC / ANSI C63.4-2009

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited To determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits both radiated and conducted emissions. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited Is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Test : Aug. 05~ 14, 2013

Prepared by : Rock zeng
(Tested Engineer / Rock Zeng)

Reviewer : Sally. zhang
(Project Manager / Sally Zhang)

Approved & Authorized Signer : Tom Chen
(Manager / Tom Chen)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Description	:	HF RFID Reader and Writer
Model Number	:	HY-100, HY-30, HY-6540TP, HY-U22H, HY-U32H, HY-U42H, HY-87D (Note: All samples are the same except the model number & appearance, so we prepare "HY-100" for EMC test only.)
Test Power Supply	:	AC 120V/60Hz for PC
Frequency	:	13.56 MHz
Antenna Gain	:	0 dBi
Antenna Type	:	Integrated
Applicant	:	Shandong Mingwah Aohan Smart Tech Co., Ltd.
Address	:	3-1005-1, Yinhe Building, 2008 Xinluo St., High-Tech District, Jinan, Shandong, China
Manufacturer	:	Jinan H-RFID Information Technology Co., Ltd.
Address	:	Room 114, 2269 Kaituo Road, High-Tech District, Jinan, Shandong, China
Date of Sample received	:	Aug. 14, 2013
Date of Test	:	Aug. 14~ Aug. 20, 2013

1.2. Auxiliary Equipment Used during Test

PC	:	Manufacturer: DELL M/N: OPTIPLEX 380 S/N: 1J63X2X CE , FCC: DOC
MONITOR	:	Manufacturer: DELL M/N: E170Sc S/N: CN-00V539-64180-055-0UPS CE , FCC: DOC
KEYBOARD	:	Manufacturer: DELL M/N: SK-8115 S/N: CN-0DJ313-71616-06C-02XN CE , FCC: DOC Cable: 1m, unshielded
MOUSE	:	Manufacturer: DELL M/N: M-UARDEL7 S/N: N/A CE , FCC: DOC Cable: 1m, unshielded
Power Line	:	Non-Shielded, 1.5m
VGA Cable	:	Non-Shielded, 1.5m
Network Cable	:	Non-Shielded, 1.5m

1.3. Description of Test Facility

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

CNAS - LAB Code: L3503
Shenzhen Anbotek Compliance Laboratory Limited., Laboratory has been assessed and in compliance with CNAS/CL01: 2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

FCC-Registration No.: 752021
Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registed 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 752021, July 10, 2013.

IC-Registration No.: 8058A-1
Shenzhen Anbotek Compliance Laboratory Limited., EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration 8058A-1, February 22, 2013.

Test Location
All Emissions tests were performed
Shenzhen Anbotek Compliance Laboratory Limited. at 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China

1.4. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 4.3dB
Conduction Uncertainty	:	Uc = 3.4dB

2. Test Procedure

GENERAL: This report shall NOT be reproduced except in full without the written approval of Shenzhen Anbotek Compliance Laboratory Limited. The EUT was transmitting a test signal during the testing.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-2009 using a spectrum analyzer with a pre-selector. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100KHz and the video bandwidth was 300KHz up to 1.0GHz and 1.0MHz with a video BW of 3.0MHz above 1.0GHz. The ambient temperature of the EUT was 74.3oF with a humidity of 69%.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

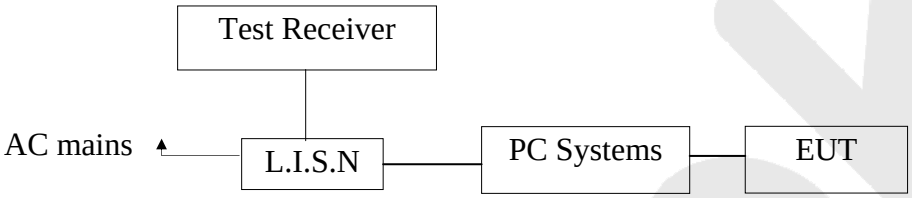
Example:
Freq (MHz) METER READING + ACF = FS
33 20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m

ANSI STANDARD C63.4-2009 10.1.7 MEASUREMENT PROCEDURES: The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The EUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation.
When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

3. POWER LINE CONDUCTED MEASUREMENT

3.1. Block Diagram of Test Setup

3.1.1 Block diagram of connection between the EUT and simulators



(EUT: HF RFID Reader and Writer)

3.2. Power Line Conducted Emission Measurement Limits (FCC Part 15 15.207)

Frequency MHz	Limits dB(μV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66 ~ 56*	56 ~ 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

3.3. Configuration of EUT on Measurement

The following equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

EUT	:	HF RFID Reader and Writer
Model Number	:	HY-100
Applicant	:	Shandong Mingwah Aohan Smart Tech Co., Ltd.

3.4. Operating Condition of EUT

3.4.1. Setup the EUT and simulator as shown as Section 3.1.
3.4.2. Turn on the power of all equipment.
3.4.3. Let the EUT work in test mode (ON) and measure it.

3.5. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.4-2009 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9KHz.

The frequency range from 150KHz to 30MHz is checked.

The test result are reported on Section 3.6.

Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Two-Line V-network	Rohde & Schwarz	ENV216	10055	Apr. 23, 2013	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Apr. 23, 2013	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Apr. 23, 2013	1 Year

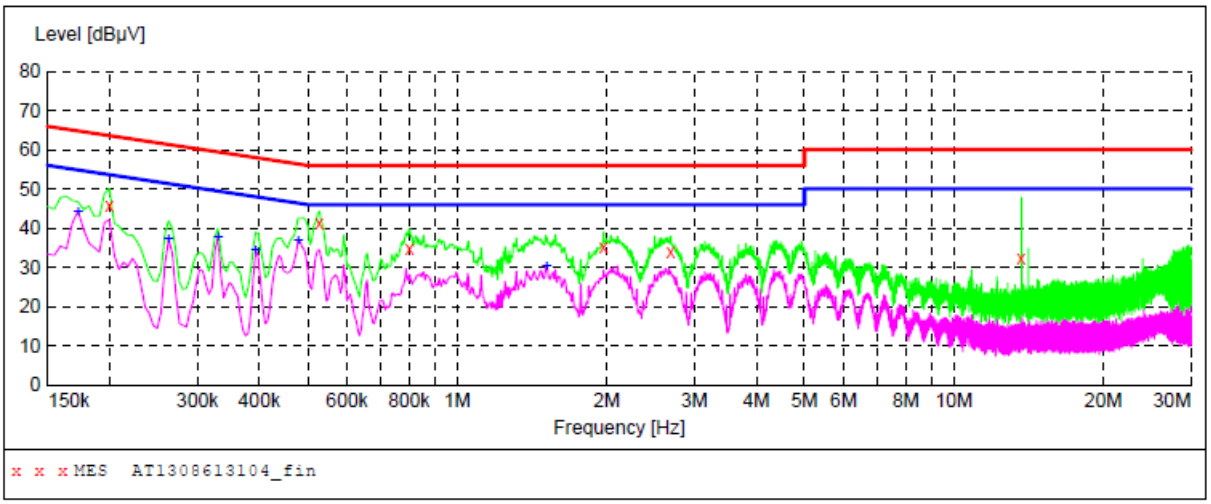
3.6. Power Line Conducted Emission Measurement Results

Pass.
Please refer to the following pages.

CONDUCTED EMISSION TEST DATA

EUT:	HF RFID Reader and Writer M/N:HY-100
Operating Condition:	ON
Test Site:	1# Shielded Room
Operator:	Finley Li
Test Specification:	AC 120/60Hz for PC
Comment:	L
	Tem:25℃ Hum:50%

SCAN TABLE: "Voltage(150K~30M)FIN"
Short Description: 150K-30M Disturbance Voltages



MEASUREMENT RESULT: "AT1308613104_fin"

8/30/2013 10:23AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.199500	45.70	20.1	64	17.9	QP	L1	GND
0.528000	41.20	20.1	56	14.8	QP	L1	GND
0.802500	34.80	20.1	56	21.2	QP	L1	GND
1.972000	35.20	20.3	56	20.8	QP	L1	GND
2.692000	34.10	20.4	56	21.9	QP	L1	GND
13.676500	32.40	20.7	60	27.6	QP	L1	GND

MEASUREMENT RESULT: "AT1308613104_fin2"

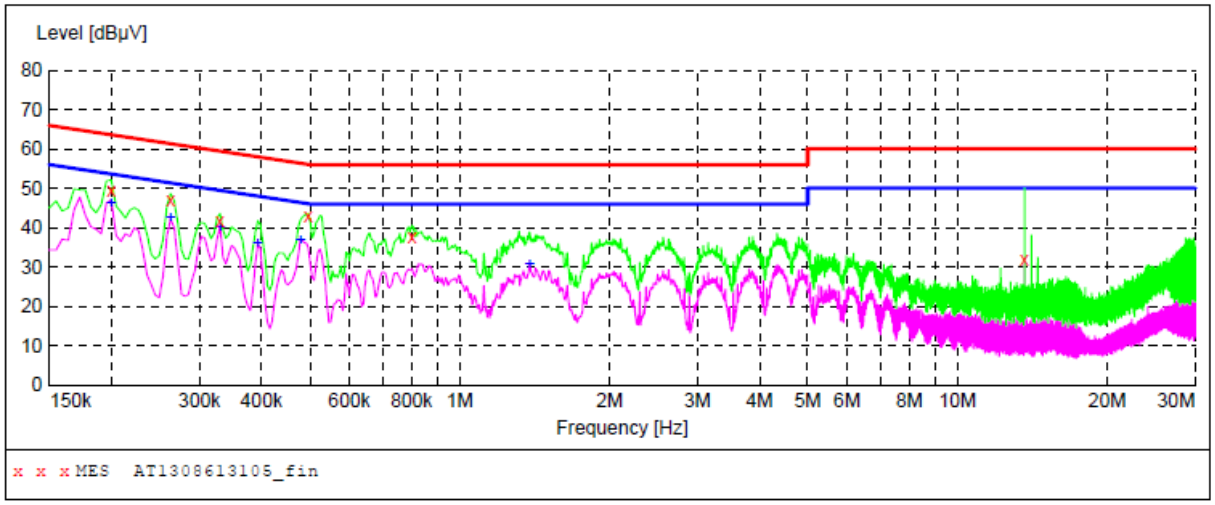
8/30/2013 10:23AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.172500	44.30	20.1	55	10.5	AV	L1	GND
0.262500	37.20	20.1	51	14.2	AV	L1	GND
0.330000	37.50	20.1	50	12.0	AV	L1	GND
0.393000	34.20	20.1	48	13.8	AV	L1	GND
0.478500	37.00	20.1	46	9.4	AV	L1	GND
1.513000	30.30	20.3	46	15.7	AV	L1	GND

CONDUCTED EMISSION TEST DATA

EUT:	HF RFID Reader and Writer M/N:HY-100
Operating Condition:	ON
Test Site:	1# Shielded Room
Operator:	Finley Li
Test Specification:	AC 120/60Hz for PC
Comment:	N
	Tem:25℃ Hum:50%

SCAN TABLE: "Voltage(150K~30M)FIN"
Short Description: 150K-30M Disturbance Voltages



MEASUREMENT RESULT: "AT1308613105_fin"

8/30/2013 10:25AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.199500	49.50	20.1	64	14.1	QP	N	GND
0.262500	47.10	20.1	61	14.3	QP	N	GND
0.330000	41.80	20.1	60	17.7	QP	N	GND
0.496500	43.00	20.1	56	13.1	QP	N	GND
0.802500	37.50	20.1	56	18.5	QP	N	GND
13.631500	32.00	20.7	60	28.0	QP	N	GND

MEASUREMENT RESULT: "AT1308613105_fin2"

8/30/2013 10:25AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.199500	46.10	20.1	54	7.5	AV	N	GND
0.262500	42.60	20.1	51	8.8	AV	N	GND
0.330000	40.20	20.1	50	9.3	AV	N	GND
0.393000	35.90	20.1	48	12.1	AV	N	GND
0.478500	36.90	20.1	46	9.5	AV	N	GND
1.382500	30.50	20.2	46	15.5	AV	N	GND

4. RADIATED EMISSION MEASUREMENT

4.1. Radiated Emission Limits

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

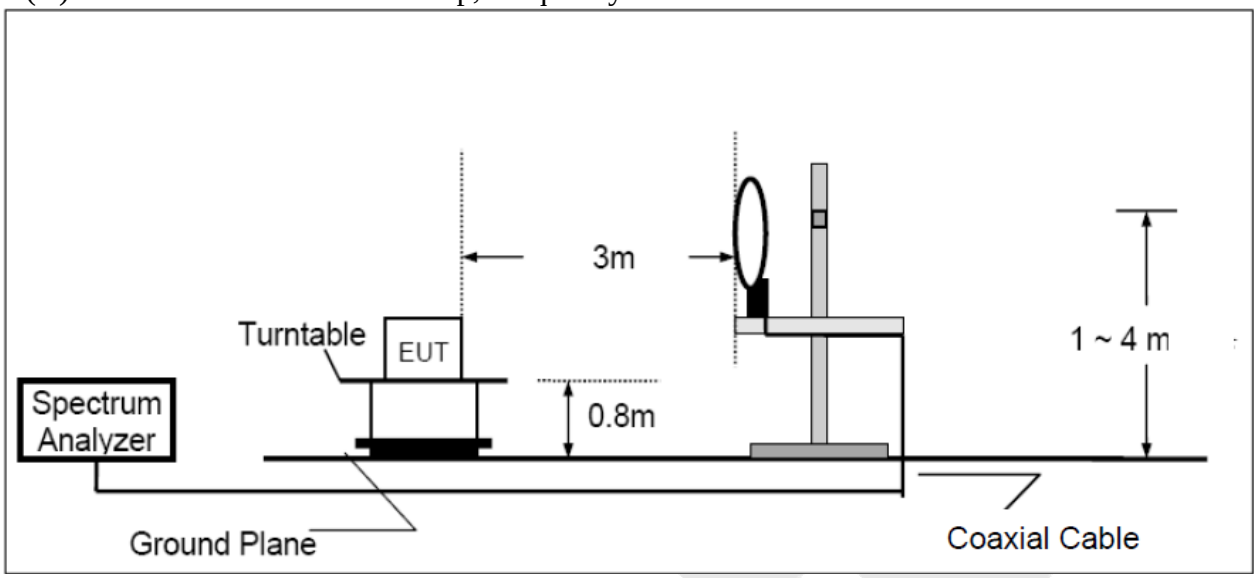
Note:
(1) The tighter limit shall apply at the boundary between two frequency range.
(2) Limitation expressed in dBuV/m is calculated by 20log Emission Level (uV/m).
(3) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula of $Ld1 = Ld2 * (d2/d1)^2$.
Example:
F.S Limit at 30m distance is 30uV/m , then F.S Limitation at 3m distance is adjusted as
$Ld1 = L1 = 30uV/m * (10)^2 = 100 * 30$ uV/m

4.2. Test Procedure

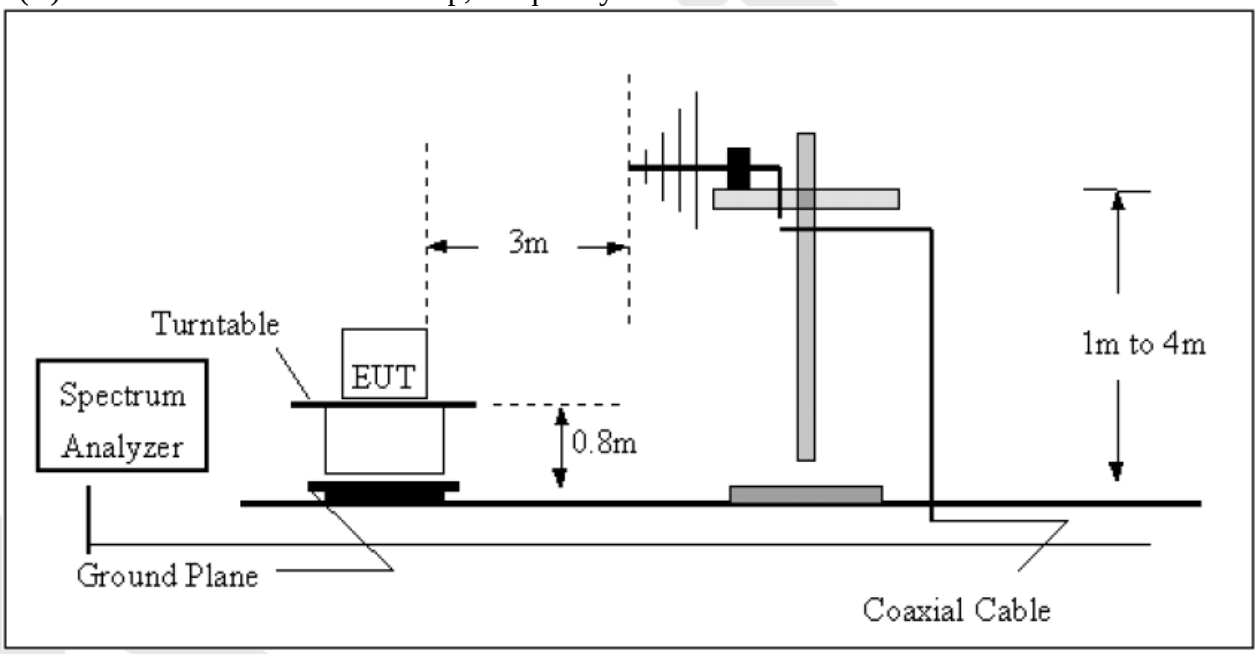
a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
c. 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.
d. 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.
e. 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.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.3. Test Setup

(A)Radiated Emission Test Set-Up, Frequency below 30MHz



(B)Radiated Emission Test Set-Up, Frequency 30-1000MHz



Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESCI	101604	Apr. 23, 2013	1 Year
2.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 23, 2013	1 Year
3.	Pre-amplifier	SONOMA	310N	186860	Apr. 23, 2013	1 Year
4.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

Radiation Uncertainty : Ur = 4.3dB

4.4. Test Results (Field Strength within the band of operation)

Freq.(MHz)	Ant. Orientation	Result at 3m (dBuV/m)	Limitation Converted 3m dist. (dBuV/m)	Margin dB
13.110	Front	59.19	80.50	-21.31
13.410	Front	63.36	80.50	-17.14
13.553	Front	71.11	90.50	-19.39
13.560	Front	82.14	124.00	-41.86
13.567	Front	67.57	90.50	-22.93
13.710	Front	62.05	80.50	-18.45
14.010	Front	58.74	80.50	-21.76
--	--	--	--	--
13.110	Side	58.96	80.50	-21.54
13.410	Side	64.52	80.50	-15.98
13.553	Side	73.38	90.50	-17.12
13.560	Side	85.33	124.00	-38.67
13.567	Side	65.11	90.50	-25.39
13.710	Side	61.75	80.50	-18.75
14.010	Side	57.92	80.50	-22.58
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Remark：

(1) Spectrum Setting:
150 K Hz – 30 MHz, RBW= 9 KHz, VBW=9 KHz, Sweep time = 200 ms.

(2) The Log-Bicon Antenna will use to test frequency range from 30MHz to 1000MHz and the Loop Antenna will use to test frequency below 30MHz.

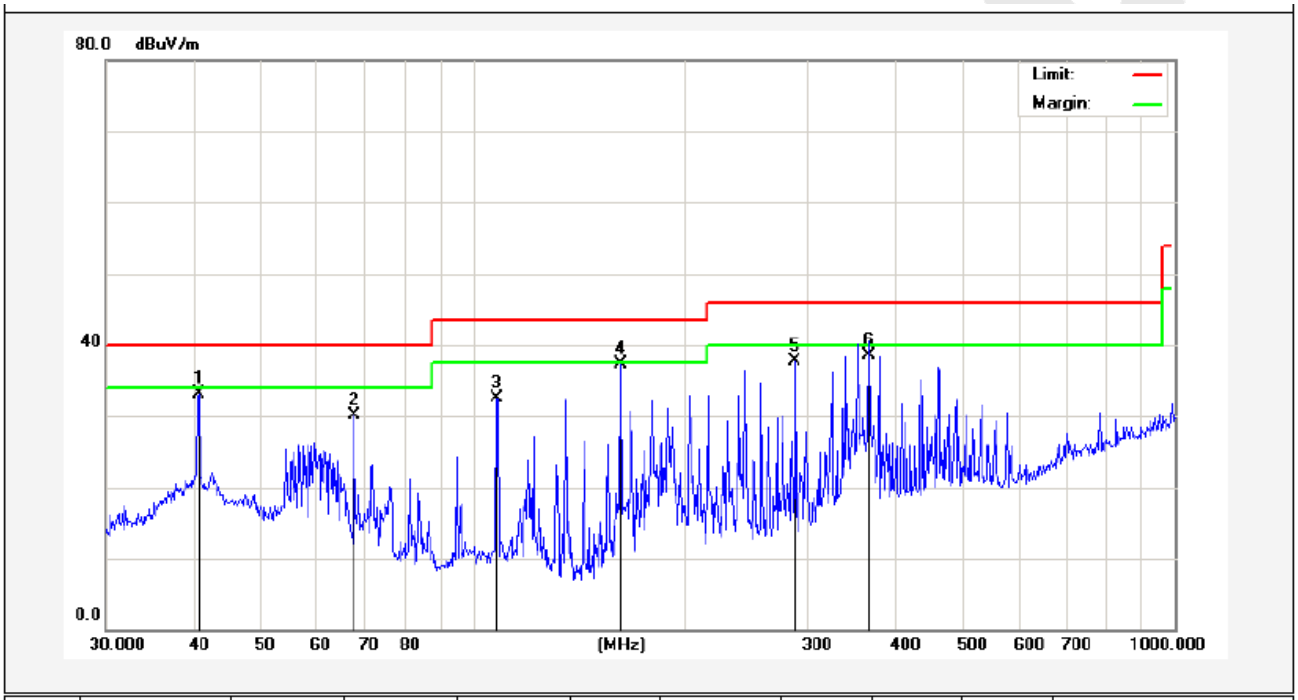
(3) If the peak scan value lower limit more than 20dB, then this signal data does not show in table.

4.5. Test Results (Field strength outside of the band of operation)

Pass.

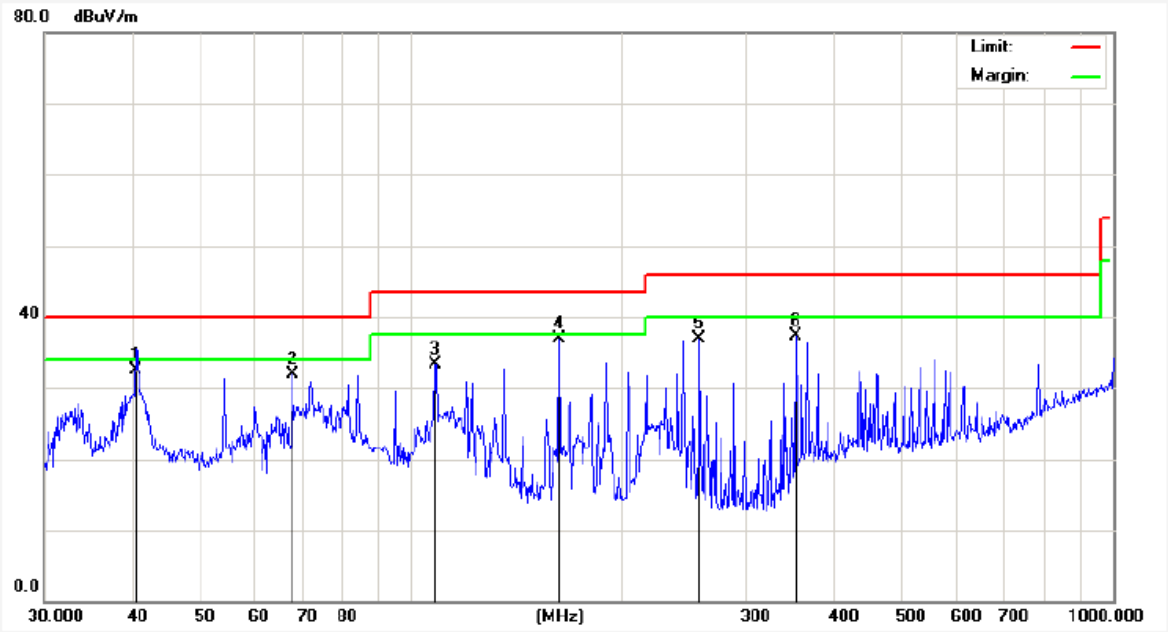
The test curves are shown in the following pages.

Job No.:	**AT1308613F**	**Polarziation:**	**Horizontal**
Standard:	**(RE)FCC PART15C _3m**	**Power Source:**	**DC 5V**
Test item:	**Radiation Test**	**Date:**	**2013/08/17**
Temp.(C)/Hum.(%RH):	**24.3(C)/55%RH**	**Time:**	**9:20:24**
EUT:	**HF RFID Reader and Writer**	**Test By:**	**Jimly Chen**
Model:	**HY-100**	**Distance:**	**3m**
Mode:	**ON**		
Note:			



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	40.7014	43.78	-10.64	33.14	40.00	-6.86	peak			
2	67.6751	48.63	-18.62	30.01	40.00	-9.99	peak			
3	108.2667	53.12	-20.65	32.47	43.50	-11.03	peak			
4	162.6106	60.08	-22.79	37.29	43.50	-6.21	peak			
5	287.9904	55.67	-18.01	37.66	46.00	-8.34	peak			
6	366.8231	52.07	-13.53	38.54	46.00	-7.46	QP	100	0	

Job No.:	**AT1308613F**	**Polarziation:**	**Vertical**
Standard:	**(RE)FCC PART15C _3m**	**Power Source:**	**DC 5V**
Test item:	**Radiation Test**	**Date:**	**2013/08/17**
Temp.(C)/Hum.(%RH):	**24.3(C)/55%RH**	**Time:**	**9:22:39**
EUT:	**HF RFID Reader and Writer**	**Test By:**	**Jimly Chen**
Model:	**HY-100**	**Distance:**	**3m**
Mode:	**ON**		
Note:			



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	40.5591	43.09	-10.58	32.51	40.00	-7.49	QP	100	0	
2	67.6751	50.60	-18.62	31.98	40.00	-8.02	peak			
3	108.2667	48.96	-15.65	33.31	43.50	-10.19	peak			
4	162.6106	54.73	-17.79	36.94	43.50	-6.56	peak			
5	257.4221	50.94	-14.00	36.94	46.00	-9.06	peak			
6	352.9433	50.30	-12.90	37.40	46.00	-8.60	peak			

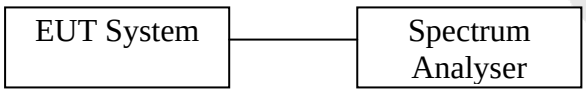
5. Frequency Tolerance

5.1. Frequency Tolerance Limits

The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency.

Fundamental Frequency (MHz)	Limit of 20dB Bandwidth (Hz)
13.56	13.56*1000*1000*0.01%=1356

5.2. Test Setups



Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyser	Agilent	E4407B	US39390582	Apr. 23, 2013	1 Year
2	EMI Receiver	Rohde & Schwarz	ESCI	100627	Apr. 23, 2013	1 Year
3.	Preamplifier	Instruments corporation	EMC011830	980100	Apr. 23, 2013	1 Year
4	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Apr. 23, 2013	1 Year
5	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

5.3. Test Procedure

Let the EUT works on temperature variation of − 20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

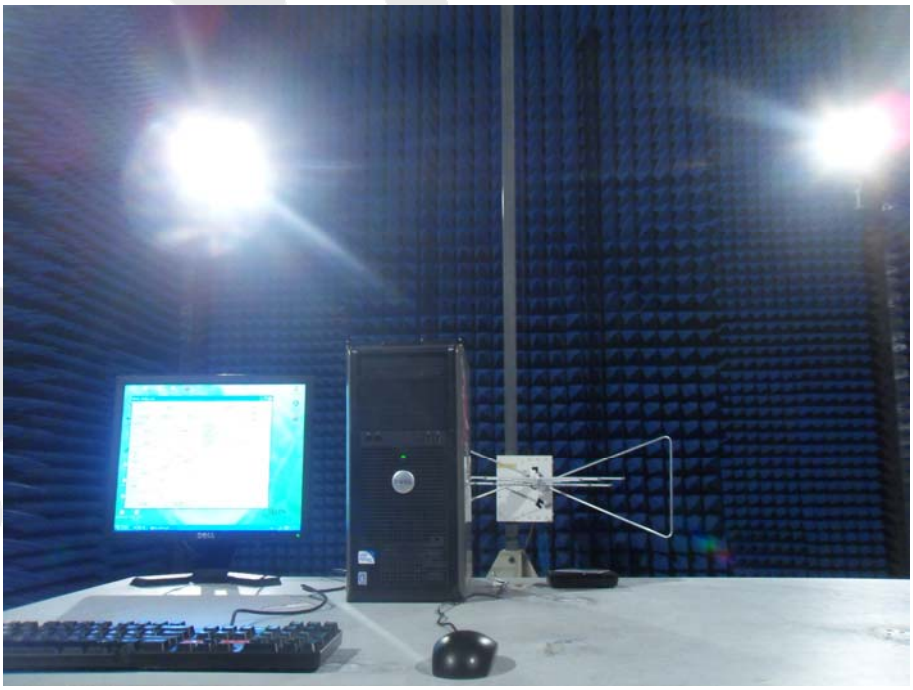
5.4. Test Results

Test Condition				
	Voltage (V)	Temperature (℃)	Test Result (Hz)	Limit (Hz)
Normal Condition	AC 120V	-20	41.22	1356
		+20	0	1356
		+50	25.07	1356
Extreme Condition	AC 102V	+20	31.22	1356
	AC 138V	+20	34.57	1356

6. PHOTOGRAPH

6.1. Photo of Conduted Emission Test

6.2. Photo of Radiation Emission Test



Appendix I (External Photos)

Figure 1
The EUT-Overall View

Figure 2
The EUT-Front View

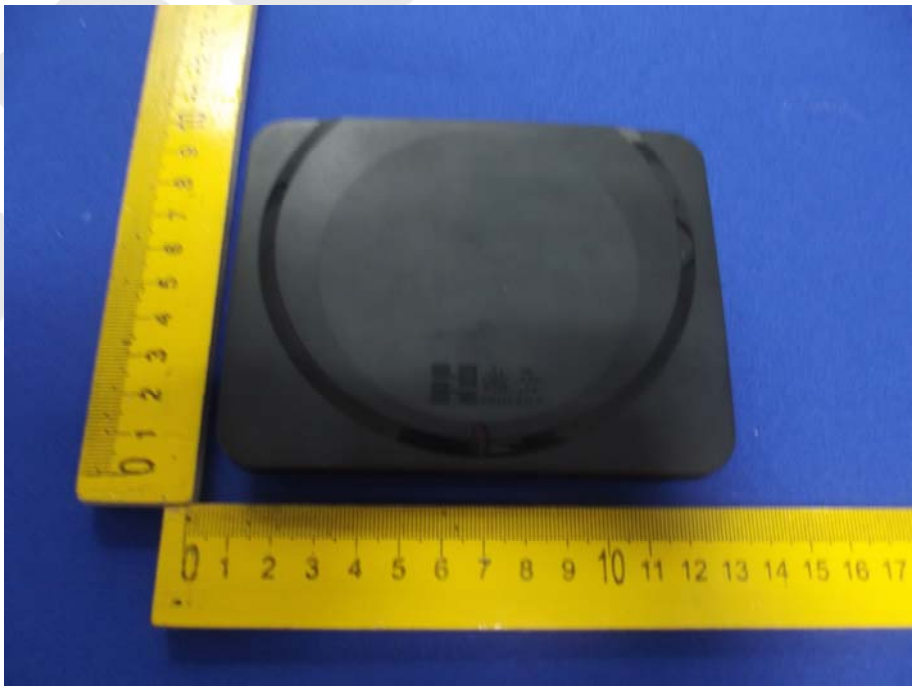
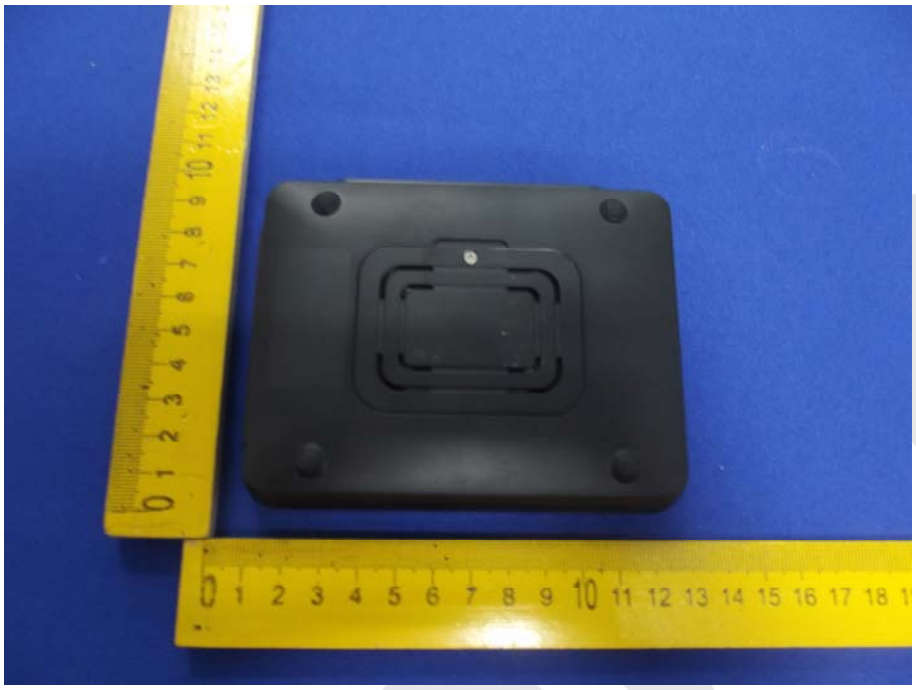


Figure 3
The EUT-Back View



Appendix II (Internal Photos)

Figure 4
The EUT-Inside View

Figure 5
PCB of the EUT-Front View

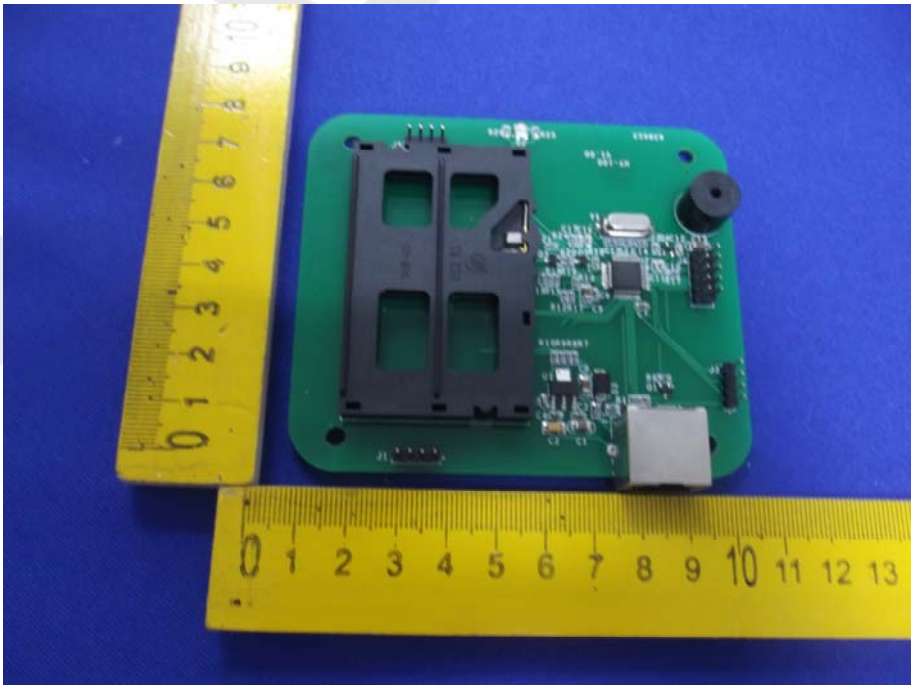


Figure 6
PCB of the EUT-Back View

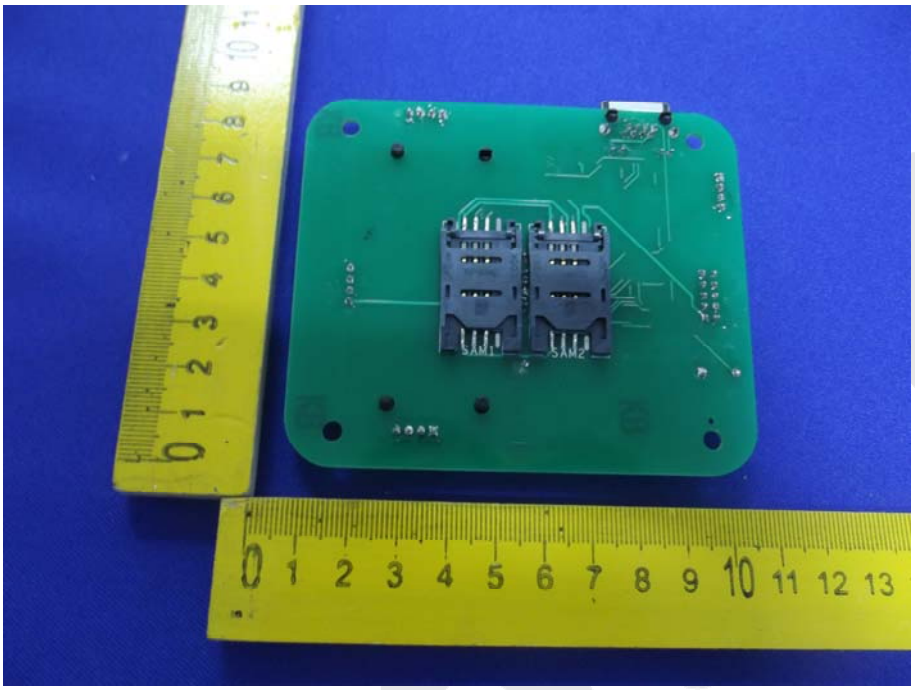


Figure 7
PCB of the EUT-Front View

Figure 8
PCB of the EUT-Back View