

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 15 SUBPART C REQUIREMENT**

OF

MIFARE Classic® EV1 CSN Readers

**Model No.: AY-M5B, AY-H5B, AY-L5B, AY-K5B, AY-M25B, AY-H25B,
AY-L25B, AY-K25B**

FCC ID: GCD-AYX25B

Trademark: Rosslare

Report No.: ES181115021E

Issue Date: November 29, 2018

Prepared for

**Rosslare Enterprises Limited.
Room 905.,12 Wang Tai Road , Kowloon Bay, Kowloon, Hong Kong.**

Prepared by

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EMTEK(SHENZHEN) CO., LTD.**

VERIFICATION OF COMPLIANCE

Applicant:	Rosslare Enterprises Limited. Room 905.,12 Wang Tai Road , Kowloon Bay, Kowloon, Hong Kong.
Manufacturer:	Rosslare Electronics (Shenzhen) Ltd. Block 2, No. A-1 Baiwangxin Industrial Park, XiLi Town, Shenzhen, China.
Product Description:	MIFARE Classic® EV1 CSN Readers
Model Number:	AY-M5B, AY-H5B, AY-L5B, AY-K5B, AY-M25B, AY-H25B, AY-L25B, AY-K25B (note: The models are the same except appearance and model number, so we prepare AY-M5B for the EMC test.)
Trademark:	Rosslare

We hereby certify that:

The above equipment was tested by EMTEK(SHENZHEN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10-2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.225(2016).

Date of Test : November 15, 2018 to November 28, 2018

Yaping Shen

Prepared by :

Yaping Shen/Editor

Joe Xia

Reviewer :

Joe Xia/Supervisor

Approved & Authorized Signer :

Lisa Wang

Lisa Wang/Manager

Modified Information

Version	Summary	Revision Date	Report No.
Ver.1.0	Original Report	/	ES181115021E

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APPENDIX (Photos of EUT) (5 pages)

1 General Information

1.1 Product Description

Characteristics	Description
EUT:	MIFARE Classic® EV1 CSN Readers
Modulation:	ASK
Operating Frequency:	13.56MHz
Number of Channels:	1 channel
Antenna Type :	Internal Loop antenna
Input rating:	DC 5V-16V
Power supply:	DC 12V from Battery
Antenna Gain	The antenna is permanently attached on PCB, no consideration of replacement. Please refer to internal Photos for details.

Note: for a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

1.2 Related Submittal(s) / Grant(s)

This submittal(s) (test report) is intended for FCC ID: GCD-AYX25B filing to comply with Section 15.225 of the FCC Part 15, Subpart C Rules.

1.3 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10-2013. Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 Special Accessories

There is a USB cable with two ferrite cores in this submission.

1.5 Equipment Modifications

Not available for this EUT intended for grant.

1.6 Test Facility

Site Description
EMC Lab. :

Accredited by CNAS, 2016.10.24
The certificate is valid until 2022.10.28
The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2005)
The Certificate Registration Number is L2291.

Accredited by TUV Rheinland Shenzhen 2016.5.19
The Laboratory has been assessed according to the requirements ISO/IEC 17025.

Accredited by FCC, August 03, 2017
Designation Number: CN1204
Test Firm Registration Number: 882943

Accredited by Industry Canada, November 24, 2015
The Certificate Registration Number is 4480A.

Accredited by A2LA, July 31, 2017
The Certificate Number is 4321.01

Name of Firm : EMTEK(SHENZHEN)CO., LTD.
Site Location : Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China

2 System Test Configuration

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 which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table 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 max. emission, the relative positions of this transmitter(EUT) was tested according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013.

2.4 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

EUT

Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
1	MIFARE Classic® EV1 CSN Readers	Rosslare	AY-M5B	GCD-AYX25B	N/A	<i>EUT</i>

Note:

- (1) Unless otherwise denoted as EUT in 『Remark』 column, device(s) used in tested system is a support equipment.

3 Summary of Test Results

FCC Rules	Description Of Test	Result
§15.207	AC Power Conducted Emission	N/A
§15.225(a)(b)(c), (d), §15.209	Radiated Emission	Complied
§15.225(e)	Frequency Stability	Complied
§15.203	Antenna Application	Complied
Note: The EUT is supplied by battery, there is no need for AC Power Conducted Emission test to be performed on this product.		

For Radiated: The EUT's antenna was pre-tested under the following modes:

Test Mode	Description
Mode A	X-Y axis
Mode B	Y-Z axis
Mode C	X-Z axis

From the above modes, the worst case was found in Mode C. Therefore only the test data of the mode was recorded in this report.

4 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-5}$
Maximum Peak Output Power Test	$\pm 1.0\text{dB}$
Conducted Emissions Test	$\pm 2.0\text{dB}$
Radiated Emission Test	$\pm 2.0\text{dB}$
Power Density	$\pm 2.0\text{dB}$
Occupied Bandwidth Test	$\pm 1.0\text{dB}$
Band Edge Test	$\pm 3\text{dB}$
All emission, radiated	$\pm 3\text{dB}$
Antenna Port Emission	$\pm 3\text{dB}$
Temperature	$\pm 0.5^{\circ}\text{C}$
Humidity	$\pm 3\%$

Remark: The coverage Factor ($k=2$), and measurement Uncertainty for a level of Confidence of 95%

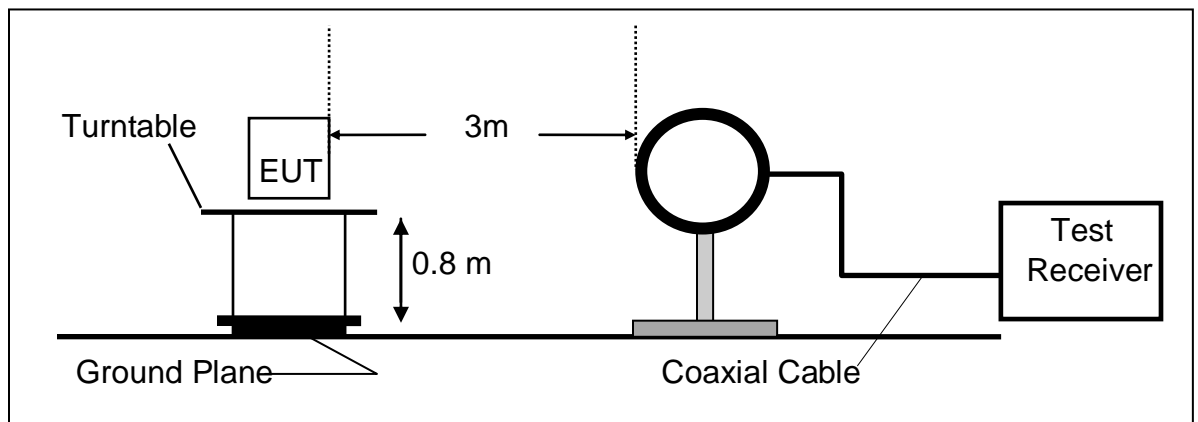
5 Radiated Emission Test

5.1 Measurement Procedure

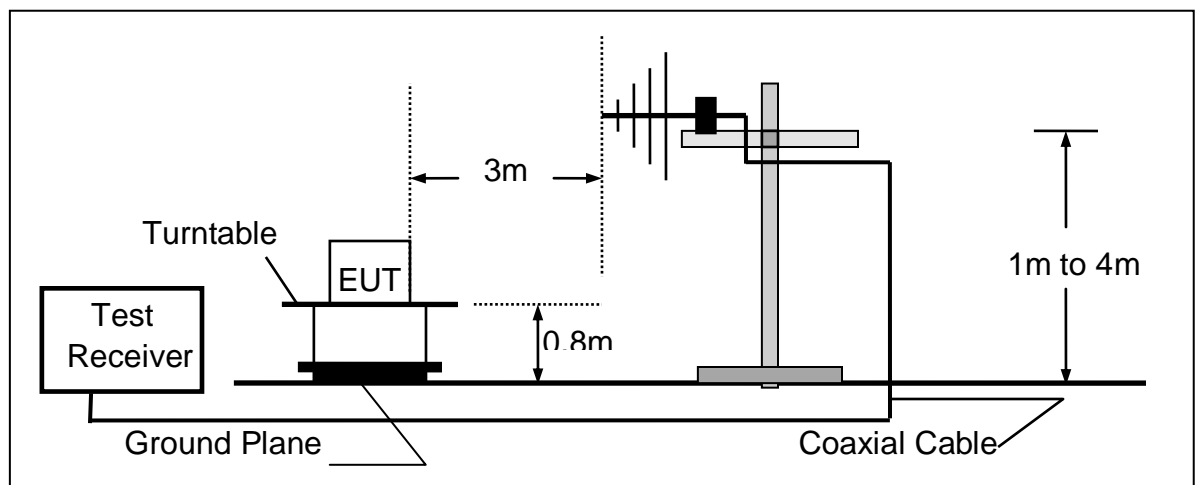
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.

5.2 Test SET-UP (Block Diagram of Configuration)

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



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



5.3 Measurement Equipment Used

Item	Equipment	Manufacturer	Model No.	Serial No.	Characteristics	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI	1166.5950.03	9KHz-3GHz	05/16/2018	1 Year
2.	Loop Antenna	Schwarzbeck	FMZB 1519	012	9 KHz -30MHz	05/16/2018	1 Year
3.	Bilog Antenna	Schwarzbeck	VULB9163	000141	25MHz-2GHz	05/16/2018	1 Year
4.	Power Amplifier	HP	8447F	OPT H64	9 KHz -1300MHz	05/16/2018	1 Year
5.	Color Monitor	SUNSP0	SP-140A	N/A	--	05/16/2018	1 Year
6.	Single Line Filter	JIANLI	XL-3	N/A	--	05/16/2018	1 Year
7.	Single Phase Power Line Filter	JIANLI	DL-2X100B	N/A	--	05/16/2018	1 Year
8.	3 Phase Power Line Filter	JIANLI	DL-4X100B	N/A	--	05/16/2018	1 Year
9.	DC Power Filter	JIANLI	DL-2X50B	N/A	--	05/16/2018	1 Year
10.	Cable	Schwarzbeck	PLF-100	549489	9KHz-3GHz	05/16/2018	1 Year
11.	Cable	Rosenberger	CIL02	A0783566	9KHz-3GHz	05/16/2018	1 Year
12.	Cable	Rosenberger	RG 233/U	525178	9KHz-3GHz	05/16/2018	1 Year

5.4 Radiated Emission Limit

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table 15.209(a):

FCC Part 15.209				
Frequency (MHz)	Field Strength Limitation		Field Strength Limitation Frequency at 3m Measurement Distance	
	(uV/m)	Dist	(uV/m)	(dBuV/m)
0.009 – 0.490	2400 / F(KHz)	300m	10000 * 2400/F(KHz)	20log 2400/F(KHz) + 80
0.490 – 1.705	24000 / F(KHz)	30m	100 * 24000/F(KHz)	20log 24000/F(KHz) + 40
1.705 – 30.00	30	30m	100* 30	20log 30 + 40
30.0 – 88.0	100	3m	100	20log 100
88.0 – 216.0	150	3m	150	20log 150
216.0 – 960.0	200	3m	200	20log 200
Above 960.0	500	3m	500	20log 500

FCC Part 15.225(a)/(b)/(c)				
Frequency (MHz)	Field Strength Limitation		Field Strength Limitation Frequency tion at 3m Measurement Dist	
	(uV/m)	Dist	(uV/m)	(dBuV/m)
13.110 – 13.410	106	30 m	106*100	80.5
13.410 – 13.553	334	30 m	334*100	90.5
13.553 – 13.567	15,848	30 m	15,848*100	124
13.567 – 13.710	334	30 m	334*100	90.5
13.710 – 14.010	106	30 m	106*100	80.5

15.205 Restricted bands of operation

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)

- Remark 1. Emission level in dBuV/m=20 log (uV/m)
: 2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of § 15.205, and the emissions located in restricted bands also comply with 15.209 limit.

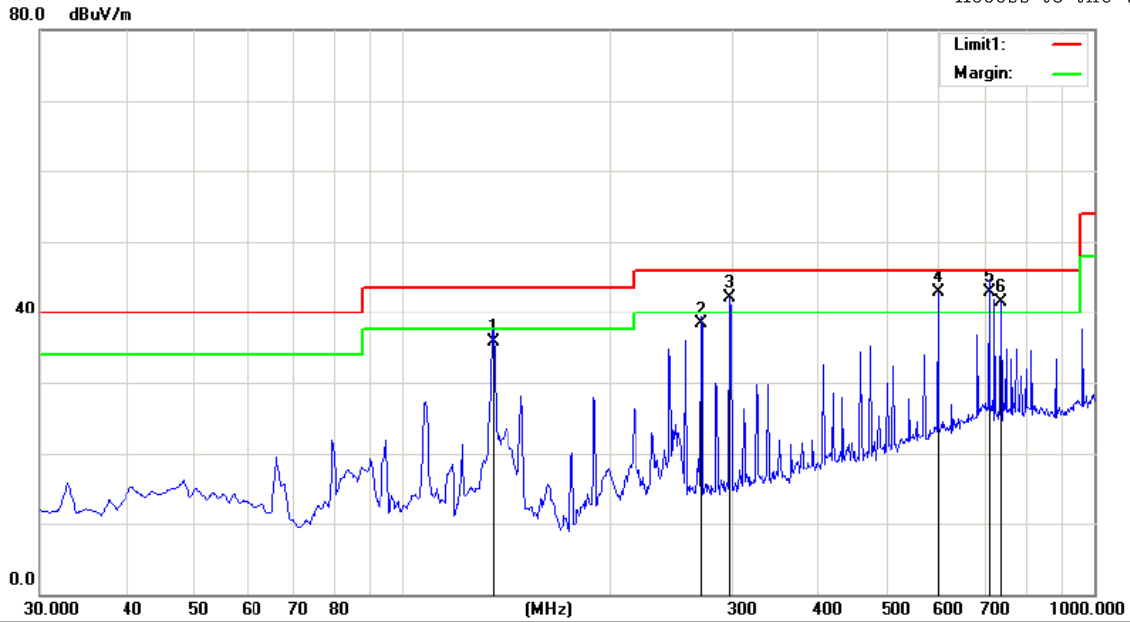
5.5 Measurement Result

Operation Mode:	TX Mode	Test Date :	November 15, 2018
Frequency Range:	9kHz~30MHz	Temperature :	28°C
Test Result:	PASS	Humidity :	65 %
Measured Distance:	3m	Test By:	KYO

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)	Note
9.32	V	33.08	69.54	-36.46	QP
12.32	V	31.19	69.54	-38.35	QP
14.55	V	35.52	69.54	-34.02	QP
16.32	V	34.19	69.54	-35.35	QP
23.52	V	36.90	69.54	-32.64	QP
27.12	V	40.33	69.54	-19.29	QP
10.23	H	31.47	69.54	-38.07	QP
11.56	H	32.60	69.54	-36.94	QP
15.32	H	36.73	69.54	-32.81	QP
20.66	H	37.81	69.54	-31.73	QP
25.34	H	34.09	69.54	-35.45	QP
27.12	H	48.36	69.54	-21.18	QP

Operation Mode:	TX Mode	Test Date :	November 15, 2018
Frequency Range:	30~1000MHz	Temperature :	28°C
Test Result:	PASS	Humidity :	65 %
Measured Distance:	3m	Test By:	KYO

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)	Note
134.7600	V	33.06	43.50	-10.44	QP
297.7200	V	32.30	46.00	-13.70	QP
542.1600	V	33.36	46.00	-12.64	QP
677.9600	V	38.27	46.00	-7.73	QP
705.1200	V	42.66	46.00	-3.34	QP
732.2800	V	33.15	46.00	-5.67	QP
119.2400	H	35.77	43.50	-7.73	QP
123.1200	H	38.34	46.00	-7.66	QP
127.9700	H	42.17	46.00	-3.83	QP
270.5600	H	42.88	46.00	-3.12	QP
298.6900	H	42.92	46.00	-3.08	QP
353.0100	H	41.60	46.00	-4.40	QP

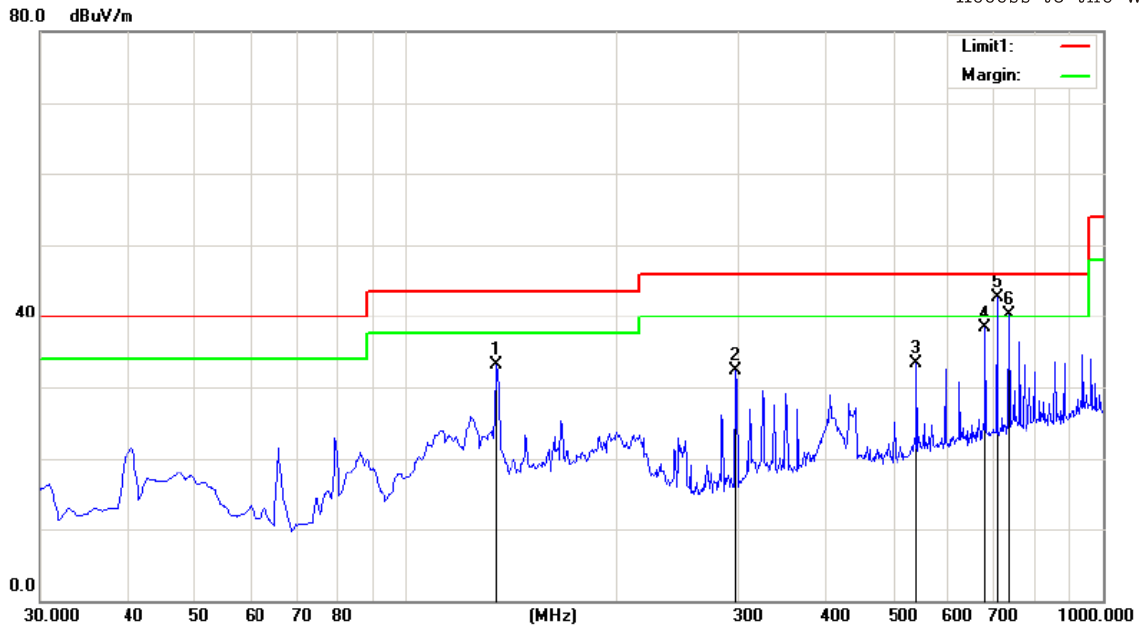


Site site #1 Polarization: **Horizontal** Temperature: 26
 Limit: (RE)FCC PART15 C_QP Power: DC 12V Humidity: 55 %
 Mode: TX
 Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		135.7300	57.32	-21.55	35.77	43.50	-7.73	QP	120	0
2		270.5600	53.26	-14.92	38.34	46.00	-7.66	QP	120	0
3	!	297.7200	56.05	-13.88	42.17	46.00	-3.83	QP	120	0
4	!	596.4800	48.93	-6.05	42.88	46.00	-3.12	QP	125	0
5	*	705.1200	47.10	-4.18	42.92	46.00	-3.08	QP	150	0
6	!	732.2800	45.50	-3.90	41.60	46.00	-4.40	QP	150	0

*:Maximum data x:Over limit !:over margin

Operator: huang



Site site #1 Polarization: **Vertical** Temperature: 26
 Limit: (RE)FCC PART15 C_QP Power: DC 12V Humidity: 55 %
 Mode:TX
 Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		134.7600	51.76	-18.70	33.06	43.50	-10.44	QP	120	0
2		297.7200	47.51	-15.21	32.30	46.00	-13.70	QP	120	0
3		542.1600	41.78	-8.42	33.36	46.00	-12.64	QP	120	0
4		677.9600	44.49	-6.22	38.27	46.00	-7.73	QP	125	0
5	*	705.1200	48.34	-5.68	42.66	46.00	-3.34	QP	150	0
6	!	732.2800	45.43	-5.10	40.33	46.00	-5.67	QP	150	0

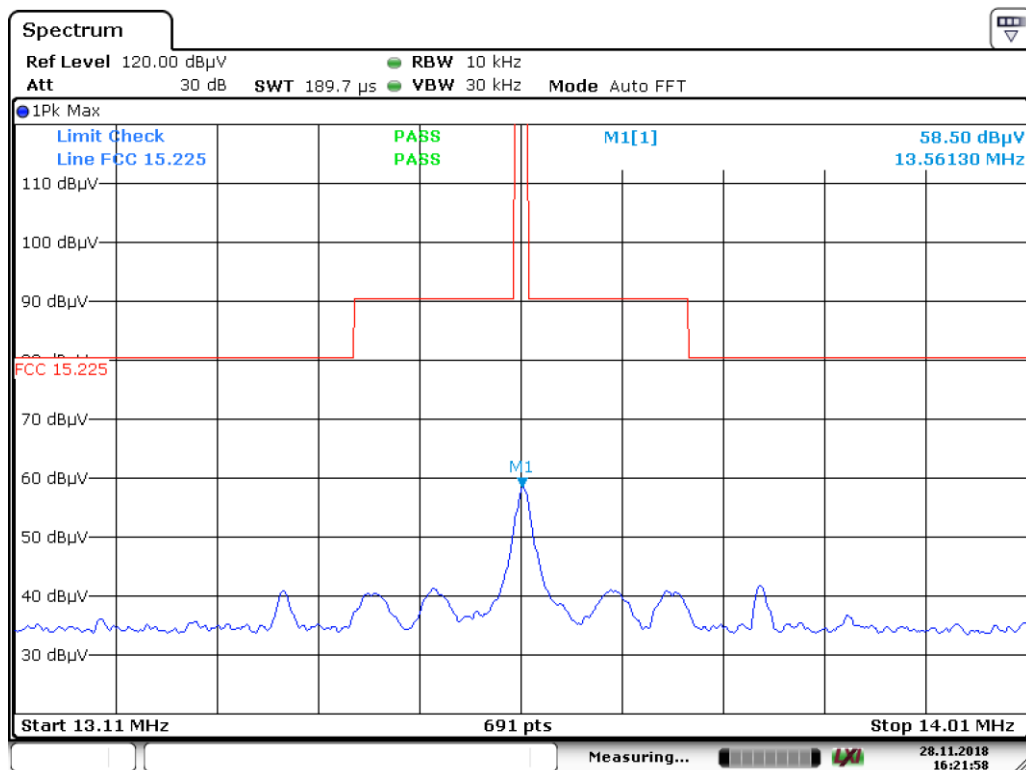
*:Maximum data x:Over limit !:over margin

Operator: huang

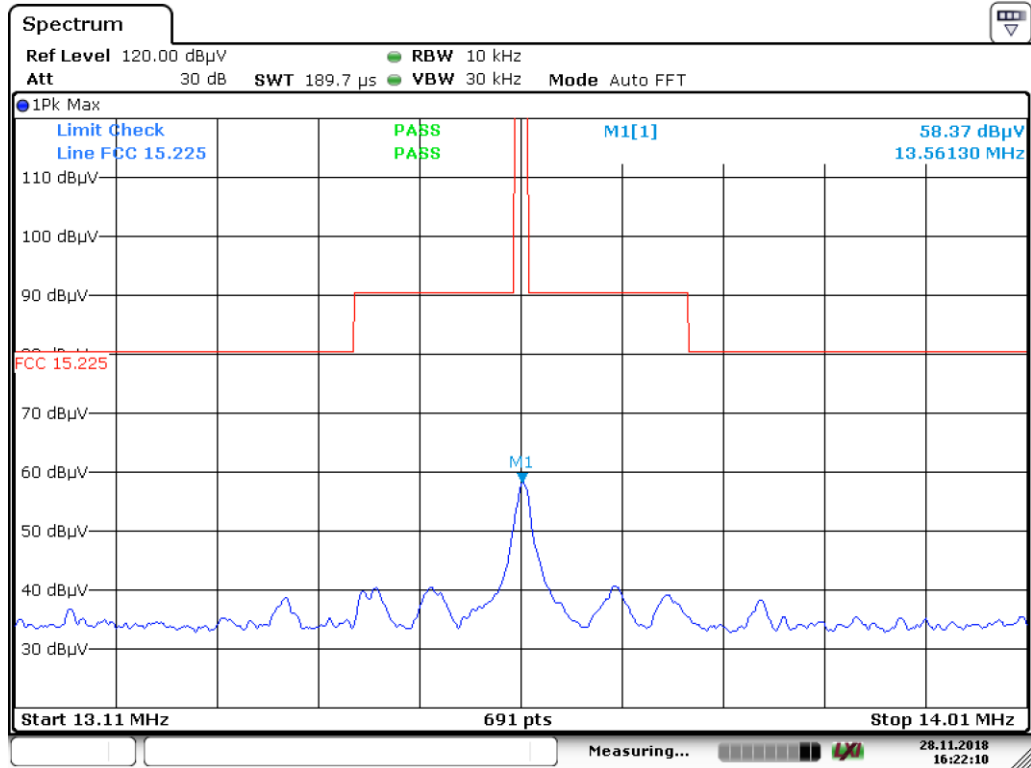
Operation Mode: TX Mode
 Frequency Range: 13.560 MHz
 Test Result: PASS
 Measured Distance: 3m

Test Date : November 27, 2018
 Temperature : 28°C
 Humidity : 65 %
 Test By: KYO

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)
13.56	V	58.50	124	-65.50
13.56	H	58.37	124	-65.63

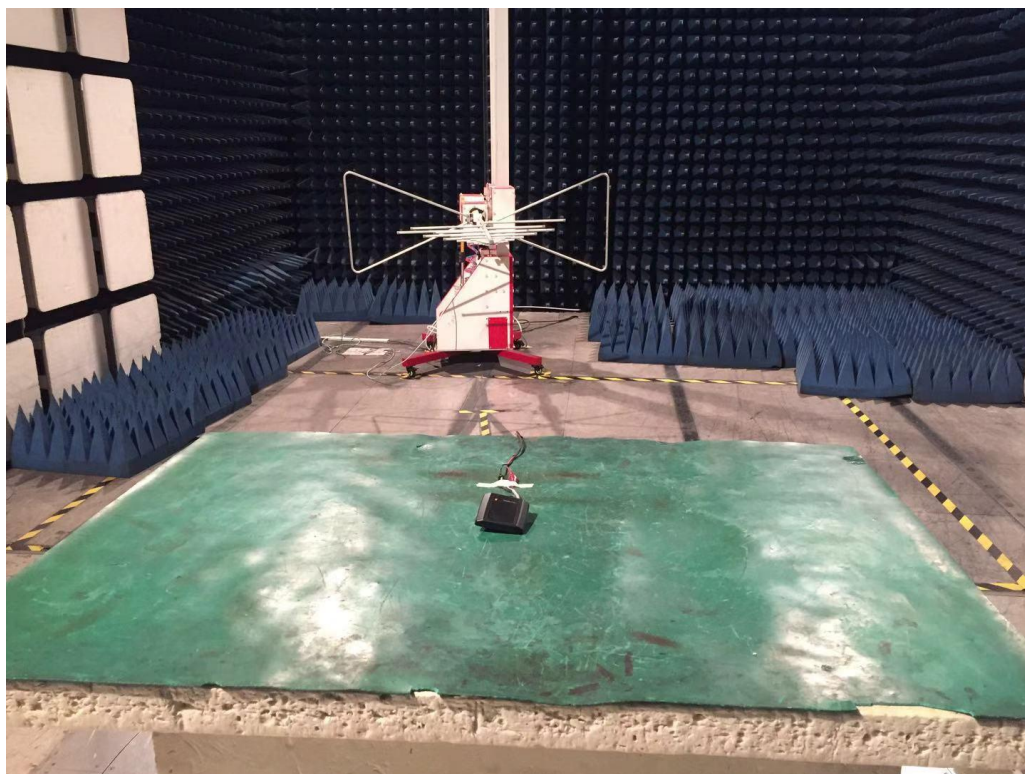
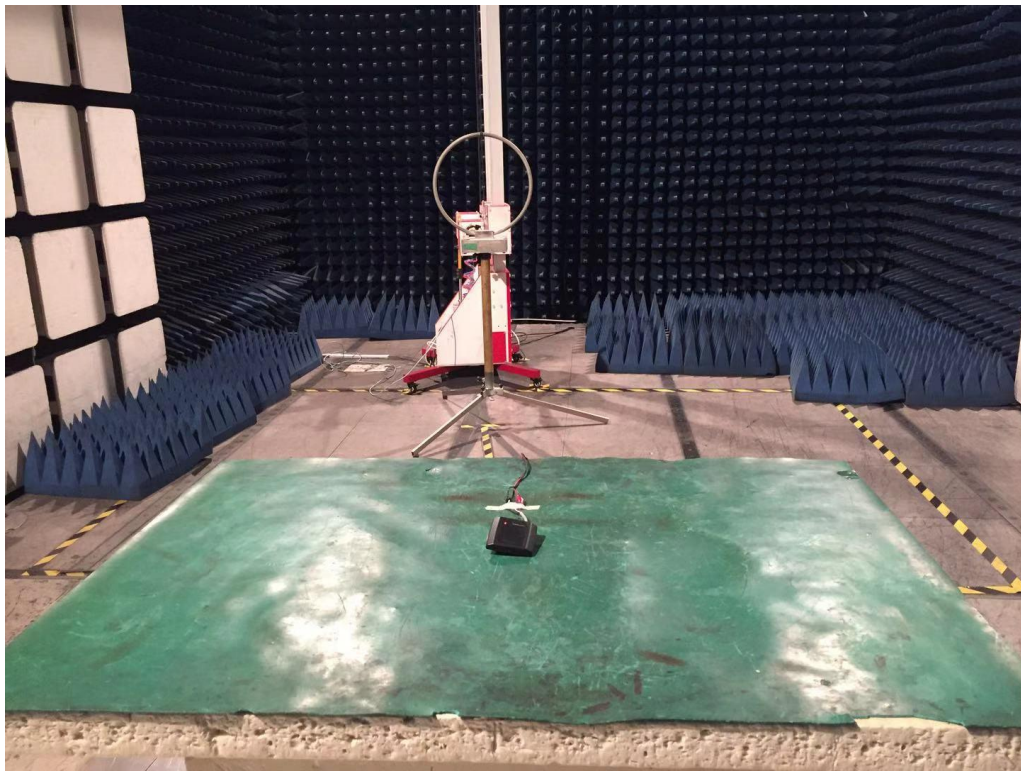


VERTICAL



HORIZONTAL

5.6 Radiated Measurement Photos:



6 FREQUENCY STABILITY MEASUREMENT

6.1 FREQUENCY STABILITY LIMITS

FCC Part 15.225(e)

the frequency tolerance of the carrier signal shall be maintained within +/-0.01% of the operating frequency over a 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.

6.2 MEASUREMENT INSTRUMENTS LIST

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	Characteristics	LAST CAL.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	FSV30	1321.3008K	10Hz-30GHz	05/16/2018	05/15/2019
Coaxial Cable	CDS	79254	46107086	10Hz-30GHz	05/16/2018	05/15/2019
Antenna Connector	ARTHUR-YANG	2244-N1TG1	N/A	10Hz-30GHz	05/16/2018	05/15/2019

Remark: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

6.3 TEST PROCEDURE

- a. The equipment under test was connected to an external AC power supply and the RF output was connected to a frequency counter via feed through attenuators. The EUT was placed inside the temperature chamber. After the temperature stabilized for approximately 20 minutes, the frequency of the output signal was recorded from the counter.
- b. At room temperature (25±5°C), an external variable DC power supply was connected to the EUT. The frequency of the transmitter was measured for 115%, 100% and 85% of the nominal operating input voltage.
- c. For the actual test configuration, please refer to the related Item –EUT Test Photos.

6.4 EUT OPERATING CONDITIONS

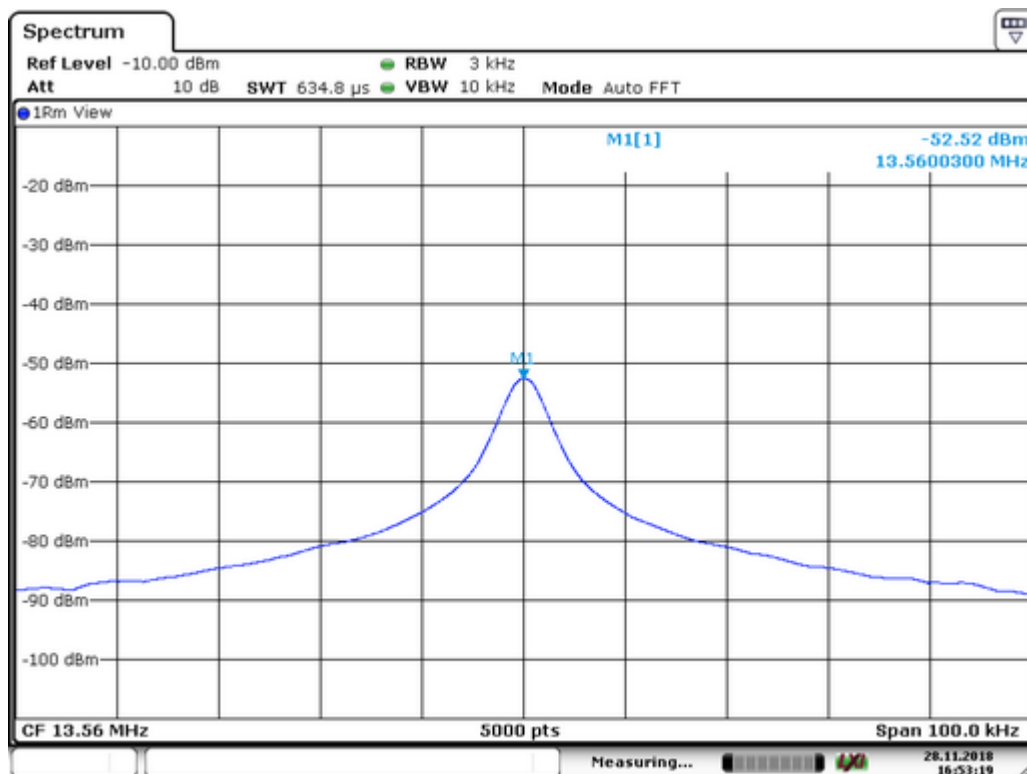
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

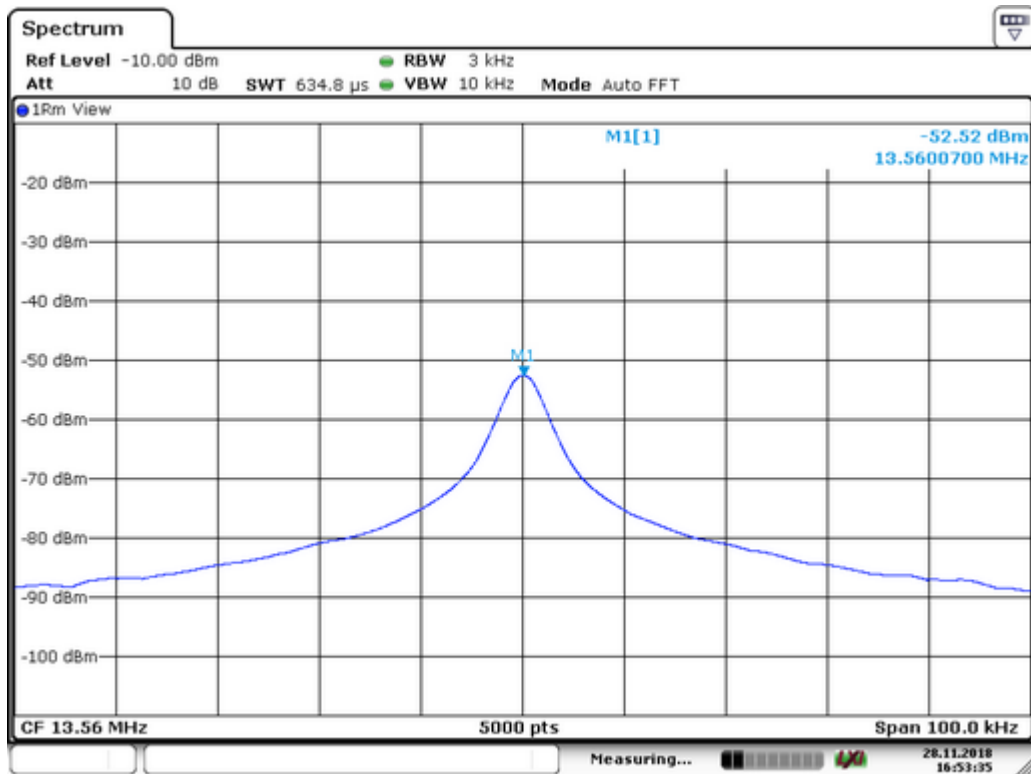
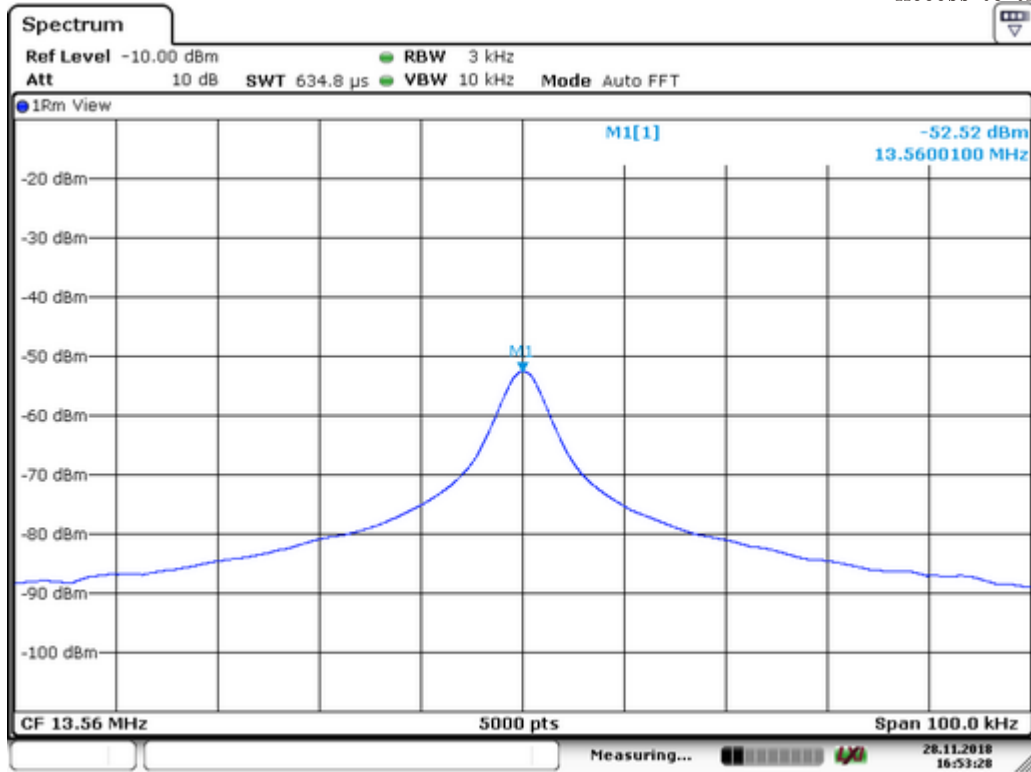
6.5 TEST RESULTS

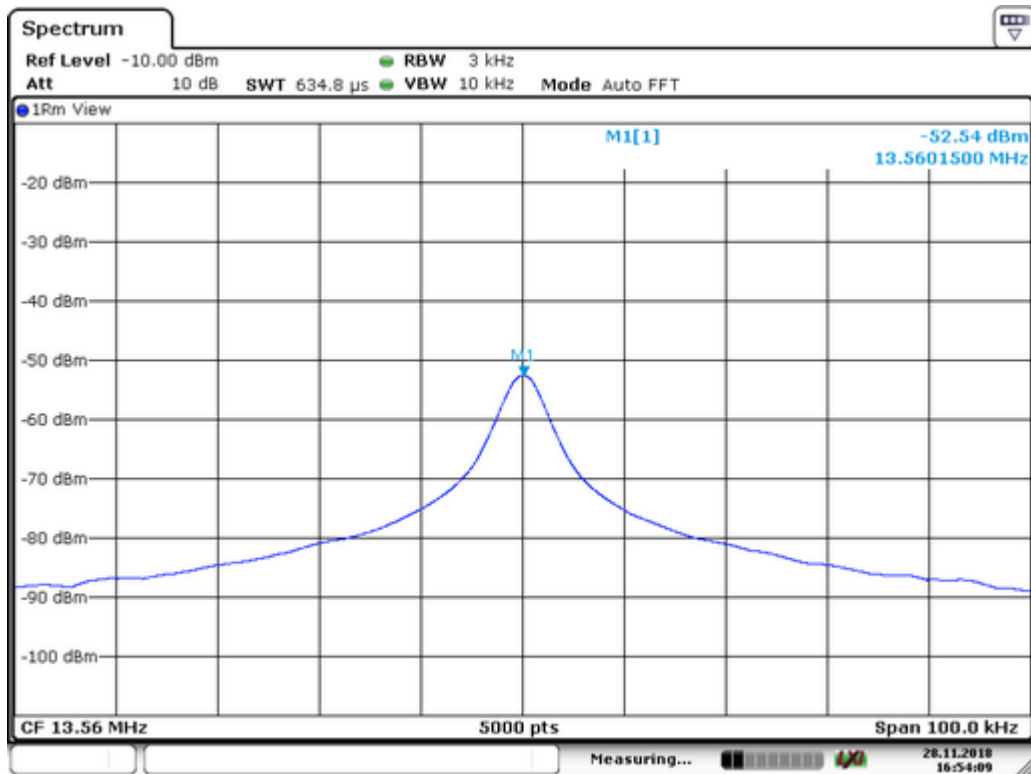
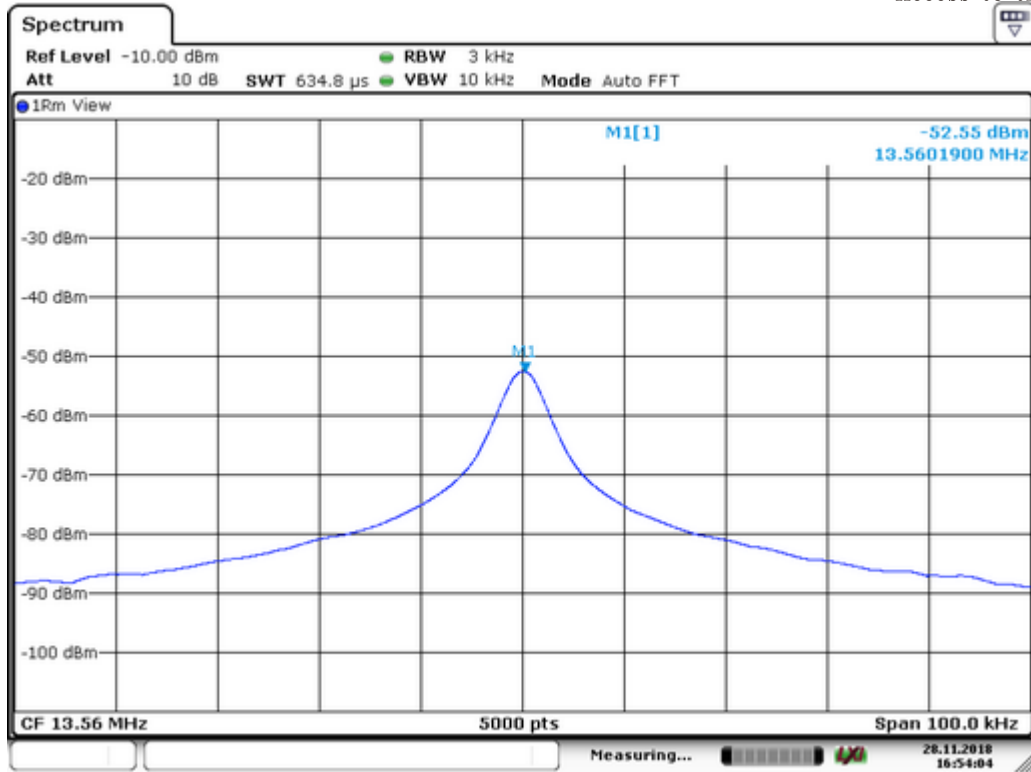
E.U.T :	MIFARE Classic® EV1 CSN Readers(Rev.A)	Test Mode :	TX Mode
Test Voltage :	DC 12V		

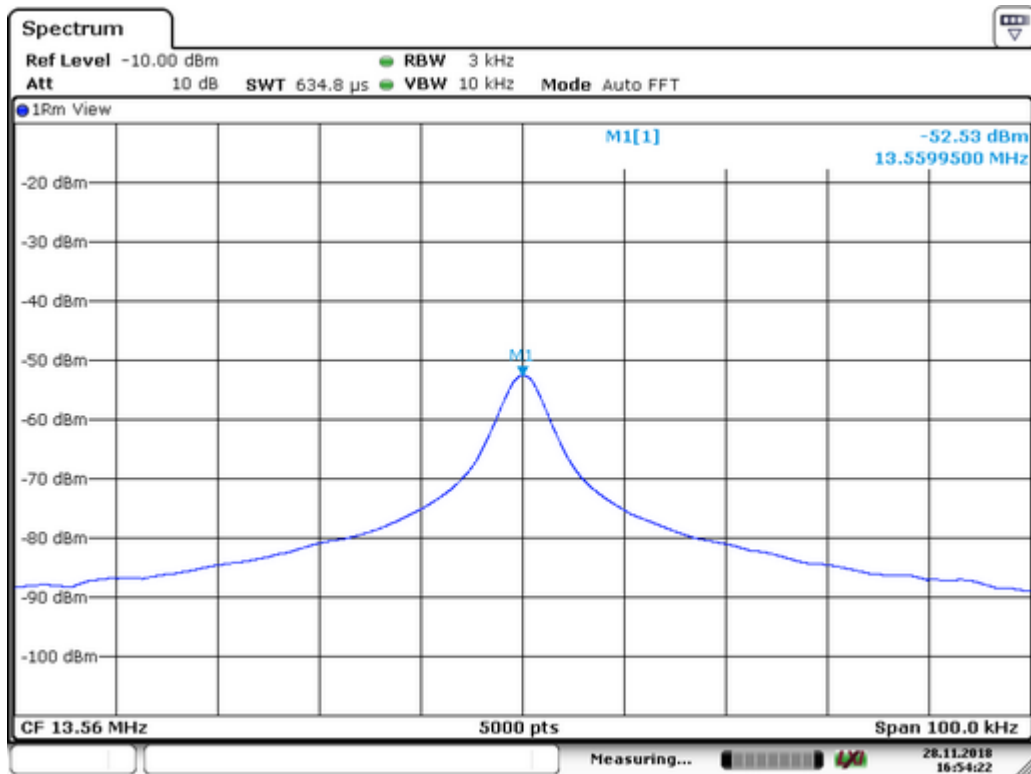
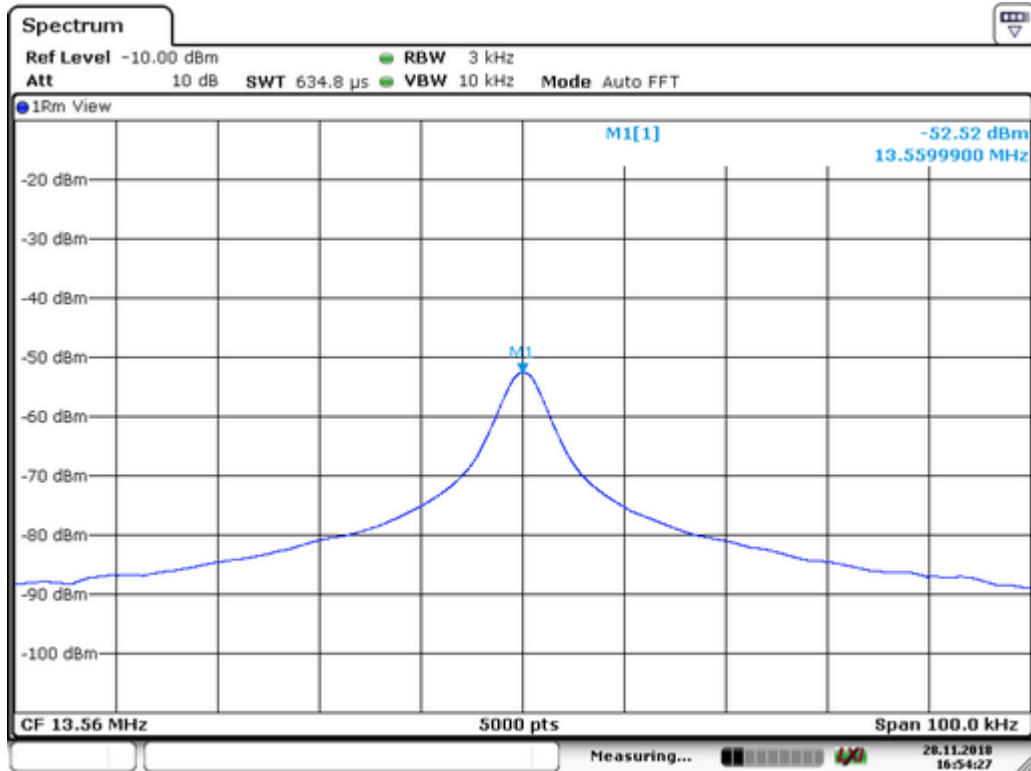
Frequency Stability Versus Environmental Temperature					
Temperature (°C)	Voltage (Vac)	Frequency (MHz)	Freq Error (ppm)	Limit (ppm)	Results
-20	DC12V	13.5600300	2.21	100	PASS
-10	DC12V	13.5600100	0.74	100	PASS
0	DC12V	13.5600700	5.16	100	PASS
10	DC12V	13.5601900	14.01	100	PASS
20	DC12V	13.5601500	11.06	100	PASS
30	DC12V	13.5599900	0.74	100	PASS
40	DC12V	13.5599500	3.69	100	PASS
50	DC12V	13.5603500	25.81	100	PASS

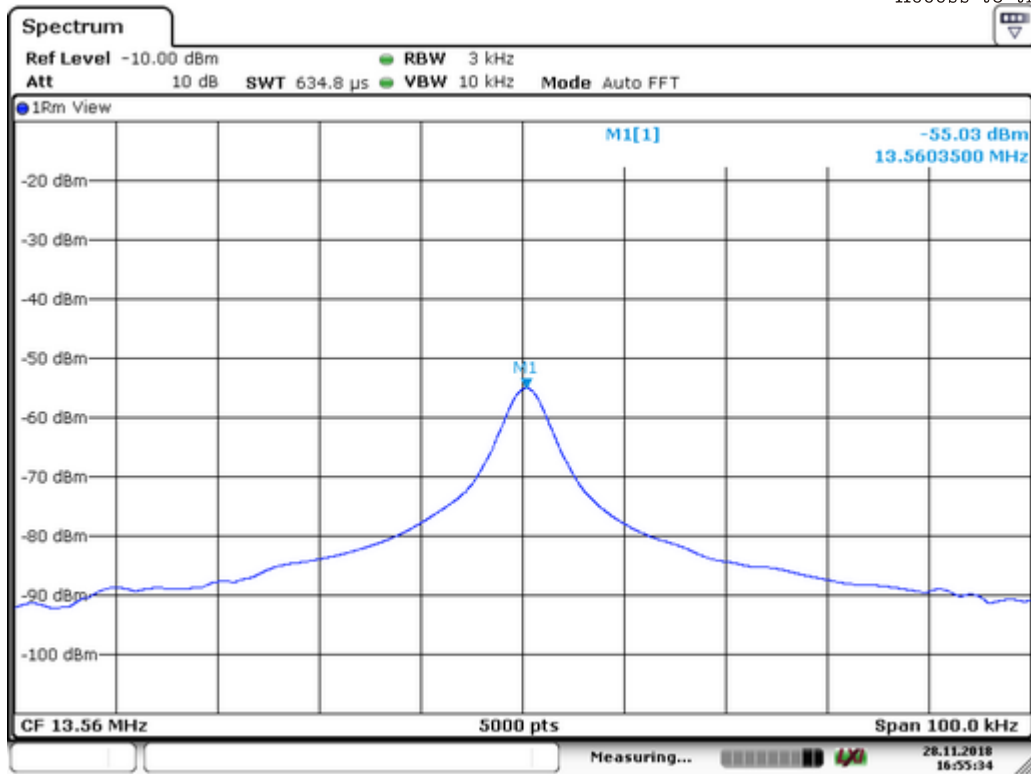
Frequency Stability Versus Environmental Temperature





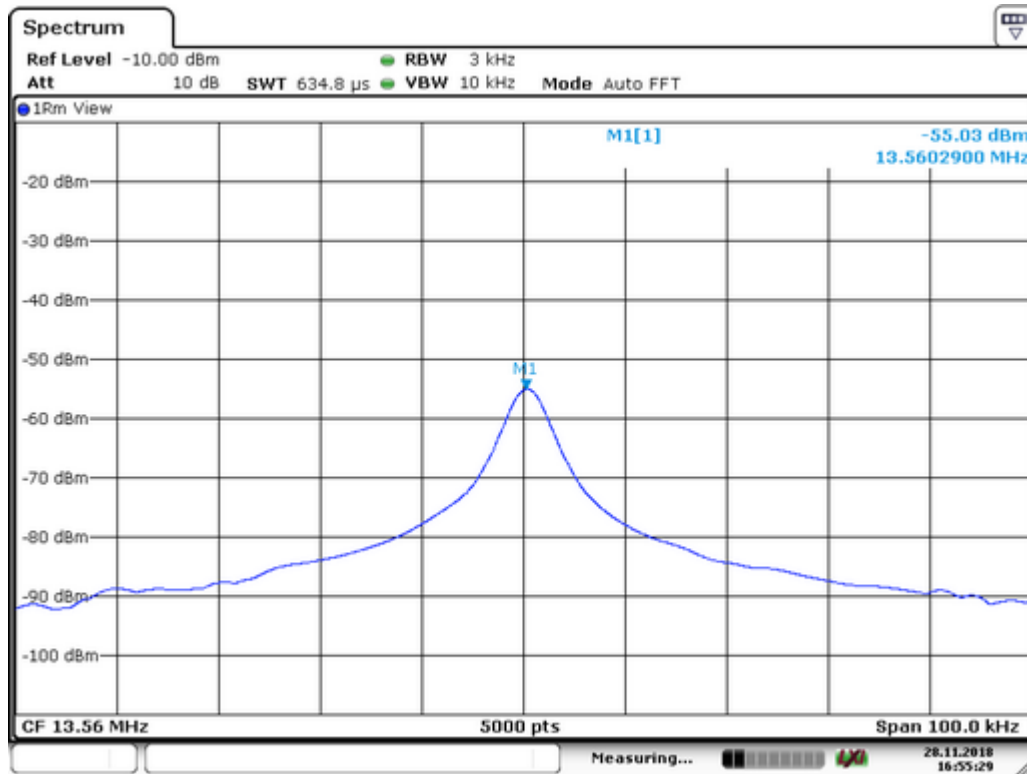


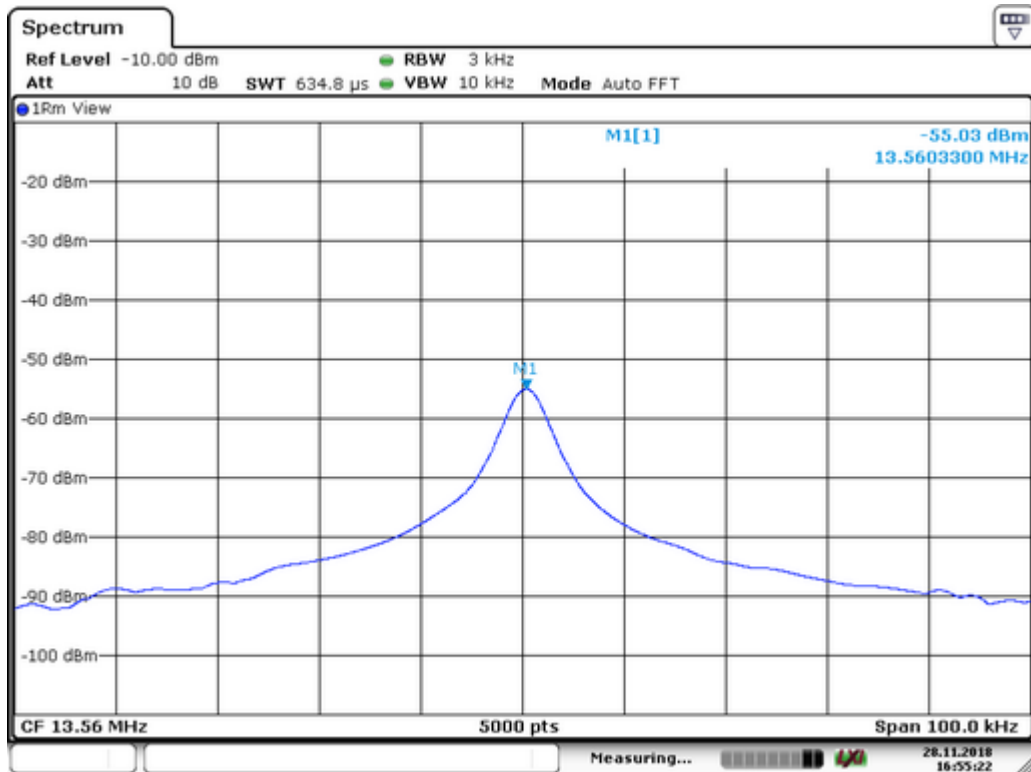
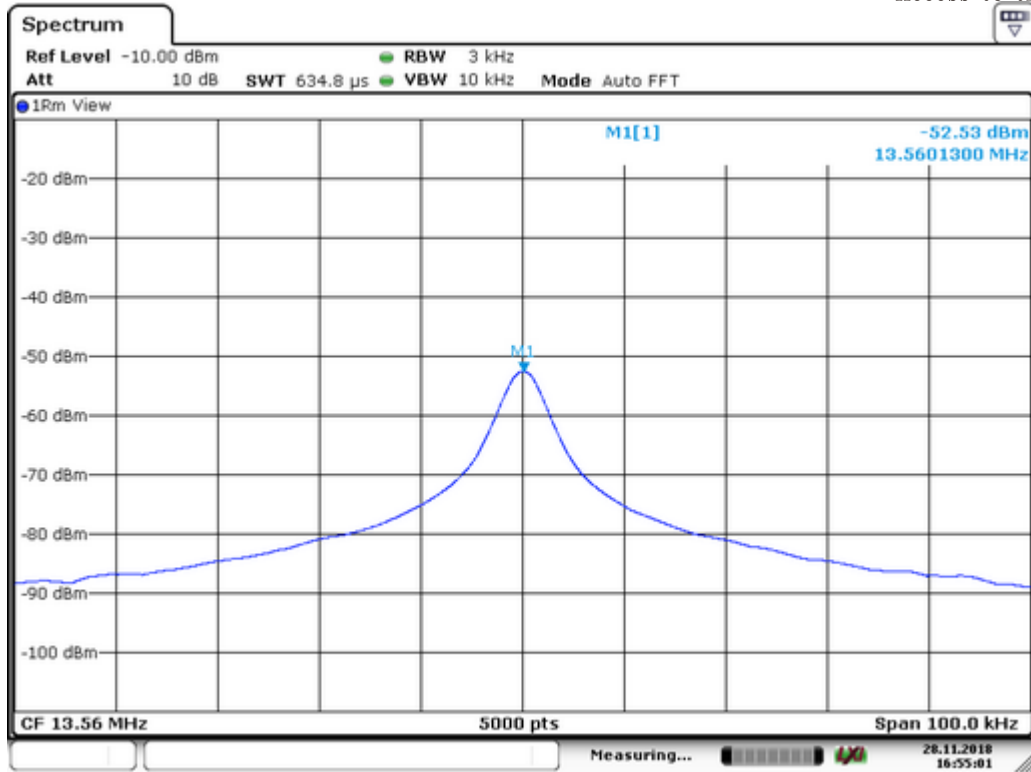




Frequency Stability Versus Input Voltage					
Temperature (°C)	Voltage (Vdc)	Frequency (MHz)	Freq Error (ppm)	Limit (ppm)	Results
25	4.25V	13.5602900	21.39	100	PASS
25	12V	13.5601300	9.59	100	PASS
25	18.4V	13.5603300	24.34	100	PASS

Frequency Stability Versus Input Voltage





7 EMISSION BANDWIDTH

7.1 Emission Bandwidth Limit

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emissions in the specific band (13.553 – 13.567 MHz).

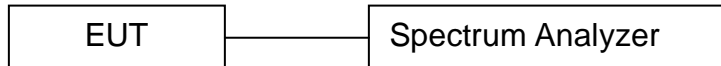
7.2 TEST INSTRUMENTS

Refer a test equipment and calibration data table in this test report.

7.3 TEST PROCEDURE

The bandwidth of the fundamental frequency was measured by spectrum analyzer with 3kHz RBW and 10kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

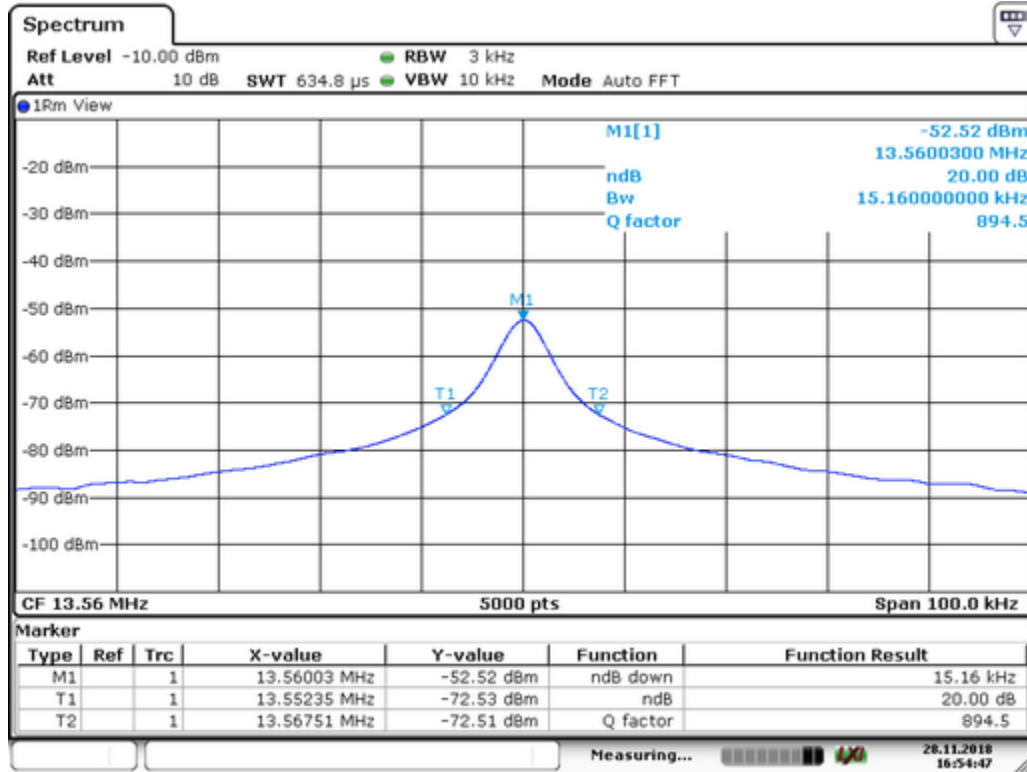
7.4 Test Setup



7.5 Test Result

Frequency (MHz)	20dB Bandwidth (kHz)	Results
13.56	15.16	PASS

BANDWIDTH TEST PLOT



8 ANTENNA REQUIREMENT

The EUT'S antenna is met the requirement of FCC part 15C section 15.203.

8.1 Result

The EUT's antenna used an inter Loop Antenna and integral on the PCB. The antenna is permanently attached on PCB, no consideration of replacement. Please refer to internal Photos for details. So it meets the requirement.

APPENDIX I (Photos of EUT)



M/N: AY-L25B



M/N: AY-L25B



M/N: AY-H25B



M/N: AY-H25B



M/N: AY-M25B



M/N: AY-M25B



M/N: AY-K5B



M/N: AY-K5B



M/N: AY-L5B



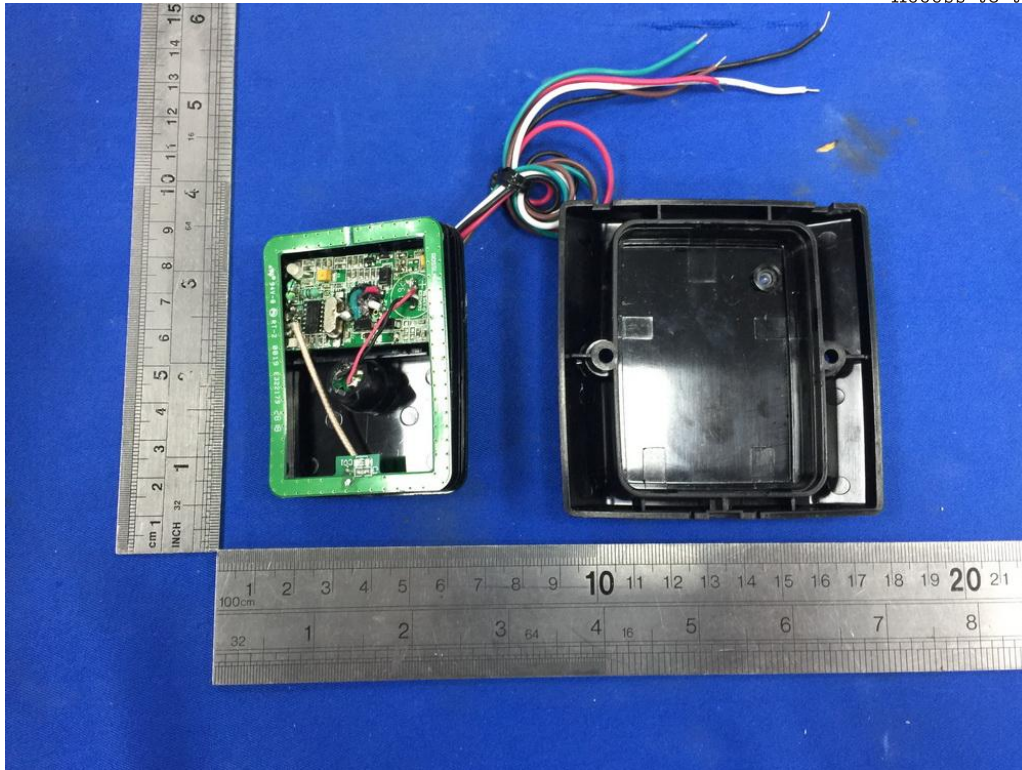
M/N: AY-L5B



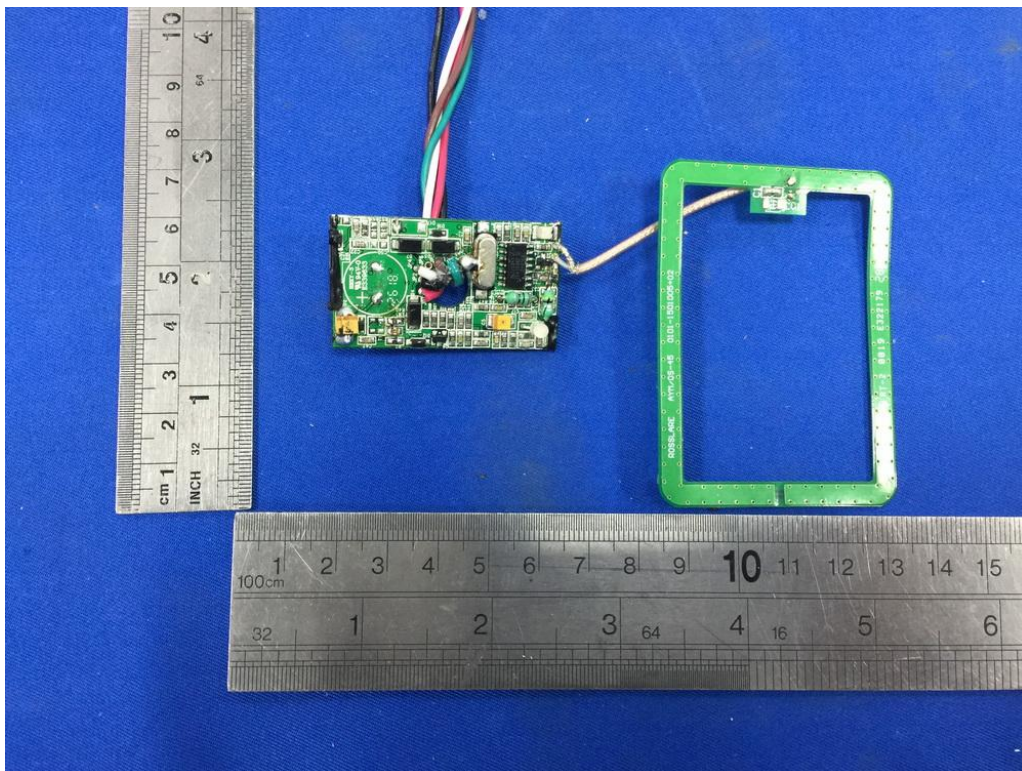
M/N: AY-H5B



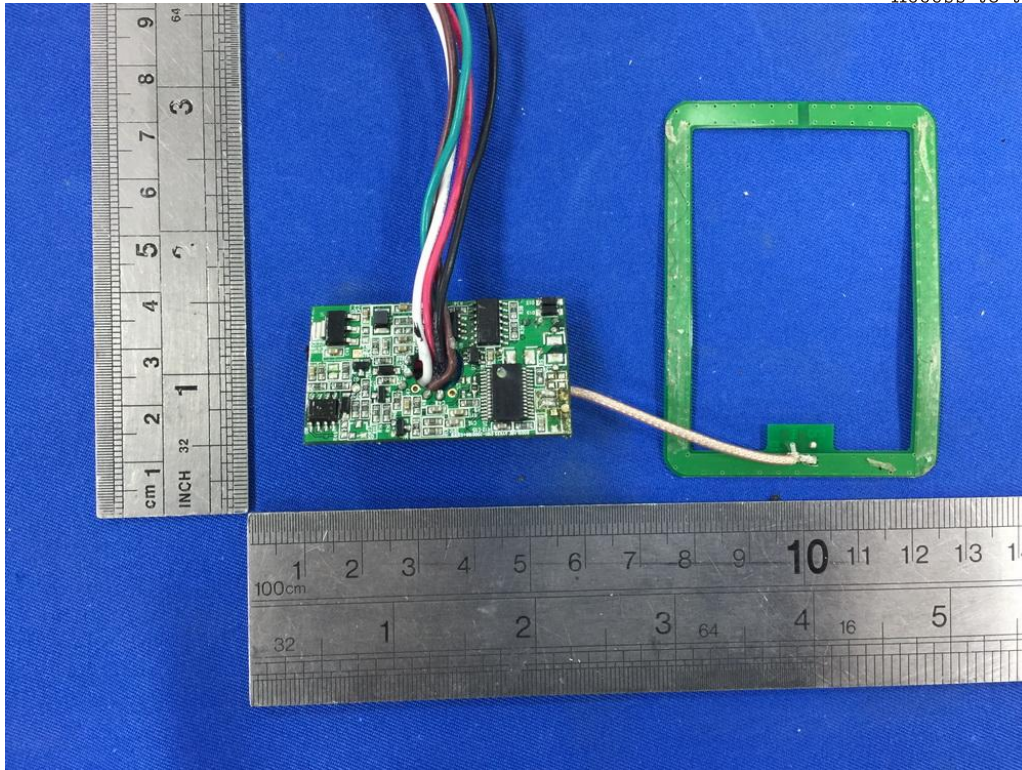
M/N: AY-H5B



M/N: AY-M5B



M/N: AY-M5B



M/N: AY-M5B

-----END OF REPORT-----