



FCC RADIO TEST REPORT

FCC ID: 2AHXUSAAT-T815A

Product : RFID Tag

Trade Name : N/A

Model Number : SAAT-T815A

Serial Model : N/A

Report No. : POCE-160416049F

Prepared for

Aerospace Innotech Co., Ltd.

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Prepared by

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VERIFICATION OF COMPLIANCE

Applicant:	Aerospace Innotech Co., Ltd.
Address	F9, Block D, SZAAT Building, 10th Road Kejinan, Hi-Tech Park, Nanshan District, Shenzhen, Guangdong, China
Manufacturer Name:	Aerospace Innotech Co., Ltd.
Product Description:	RFID Tag
Brand Name:	N/A
Model Name:	SAAT-T815A
Model difference:	N/A
Test procedure	ANSI C63.10: 2013
Standards	FCC PART15.249

This device described above has been tested by POCE, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test

Date (s) of performance of tests 1 Apr. 2016 ~15 Apr. 2016

Date of Issue 15 Apr. 2016

Test Result **Pass**

Testing Engineer :



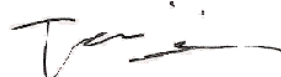
(Ken Li)

Technical Manager :



(Jimmy Yao)

Authorized Signatory :



(Terry Yang)

Table of Contents	Page
1 . SUMMARY OF TEST RESULTS	4
1.1 TEST FACILITY	5
1.2 MEASUREMENT UNCERTAINTY	5
2 . GENERAL INFORMATION	6
2.1 GENERAL DESCRIPTION OF EUT	6
2.2 DESCRIPTION OF TEST MODES	7
2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	8
2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)	9
2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS	10
3 . TEST RESULT	11
3.1 ANTENNA REQUIREMENT	11
3.1.1 STANDARD REQUIREMENT	11
3.1.2 EUT ANTENNA	11
3.2 CONDUCTED EMISSION MEASUREMENT	12
3.2.1 POWER LINE CONDUCTED EMISSION LIMITS	12
3.2.2 TEST PROCEDURE	13
3.2.3 DEVIATION FROM TEST STANDARD	13
3.2.4 TEST SETUP	13
3.2.5 TEST RESULT	14
3.3 RADIATED EMISSION MEASUREMENT	15
3.3.1 RADIATED EMISSION LIMITS	15
3.3.2 TEST PROCEDURE	16
3.3.3 DEVIATION FROM TEST STANDARD	16
3.3.4 TEST SETUP	17
3.3.5 TEST RESULTS (BLOW 30MHZ)	19
3.3.6 TEST RESULTS (BETWEEN 30 – 1000 MHZ)	20
3.3.7 TEST RESULTS (ABOVE 1000 MHZ)	23
4 . 20DB BANDWIDTH TEST	25
4.1 TEST PROCEDURE	25
4.2 DEVIATION FROM STANDARD	25
4.3 TEST SETUP	25
4.4 TEST RESULTS	26
APPENDIX-PHOTOGRAPHS OF EUT CONSTRUCTIONAL DETAILS	

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15, Subpart C (15.249)			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	N/A	
15.203	Antenna Requirement	Pass	
15.249	Radiated Spurious Emission	Pass	
15.249	20 DB Bandwidth	Pass	
15.205	Band Edge Emission	Pass	

1.1 TEST FACILITY

Shenzhen POCE Technology Co.,Ltd.

Add.: Room 502, Bldg. 1, Xinghua Garden, Baoan Road Xixiang, Baoan District, Shenzhen, China

FCC-Registration No.: 222278

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 1.38\text{dB}$
2	RF power,conducted	$\pm 0.16\text{dB}$
3	Spurious emissions,conducted	$\pm 0.21\text{dB}$
4	All emissions,radiated(<1G)	$\pm 4.68\text{dB}$
5	All emissions,radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	RFID Tag	
Trade Name	N/A	
Model Name	SAAT-T815A	
Serial Model	N/A	
Model Difference	N/A	
Product Description	The EUT is a RFID Tag	
	Operation Frequency:	916MHz
	Modulation Type:	GFSK
	Channel number	1 channel
	Antenna Designation:	Wire antenna
	Antenna Gain(Peak)	-2.1dBi
	Max. QP field strength	91.21 dBuV/m@3m
	Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.	
Power Supply	DC3.7V,1000mAH	

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	TX

For Conducted Emission	
Final Test Mode	Description
Mode 1	TX

For Radiated Emission	
Final Test Mode	Description
Mode 1	TX

NOTE: The EUT configured to transmit signals continuously. (duty cycle>98%)

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

E-1
EUT

2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	RFID Tag	N/A	SAAT-T815A	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	EMI Test Receiver	R&S	ESU8	100316	2015/10/25	2016/10/24
2	Double Ridged Horn Antenna (0.8GHz-18GHz)	R&S	HF907	100276	2015/11/01	2016/10/31
3	Log-periodic Dipole Antenna (30MHz-1GHz)	R&S	HL223	100435	2015/11/01	2016/10/31
4	Biconical Antenna (9K-30MHz)	R&S	HK116	100431	2015/10/25	2016/10/24
5	Pre-amplifier	Schwarzbeck	VULB 9163	9163-462	2015/04/12	2016/04/11
6	Signal Conditioning Unit	R&S	SCU-08	10008	2015/10/25	2016/10/24
7	Rod Antenna (9K-30MHz)	R&S	HFH2-Z6	100386	2015/11/01	2016/10/31
8	Pre-amplifier	R&S	SCU-01	10049	2015/10/25	2016/10/24
9	Active loop antenna (9K-30MHz)	Schwarzbeck	FMZB1519	1519-038	2015/11/01	2016/10/31
10	Spectrum Analyzer	Agilent	E4407B	MY45109572	2015/11/01	2016/10/31

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Test Receiver	R&S	ESU8	100316	2015/10/25	2016/10/24
	Current Probe	R&S	EZ-17	100532	2015/10/25	2016/10/24
3	Two Line V-Network	R&S	ENV216	101109	2015/10/25	2016/10/24
4	Passive Voltage Probe	R&S	ESH2-Z3	100169	2015/10/25	2016/10/24
5	V-Network	R&S	ESH3-Z6	100694	2015/10/25	2016/10/24
6	V-Network	R&S	ESH3-Z6	100690	2015/10/25	2016/10/24
7	Artificial mains	R&S	ESH2-Z5	100309	2015/10/25	2016/10/24
8	Pulse Limiter	R&S	ESH3-Z2	101242	2015/10/25	2016/10/24

3. TEST RESULT

3.1 ANTENNA REQUIREMENT

3.1.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 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.

3.1.2 EUT ANTENNA

The EUT antenna is Wire Antenna. It's permanent attached antenna. It comply with the standard requirement.

3.2 CONDUCTED EMISSION MEASUREMENT

3.2.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class B (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	56.00	46.00	CISPR
5.0 -30.0	60.00	50.00	CISPR

0.15 -0.5	66 - 56 *	56 - 46 *	LP002.
0.50 -5.0	56.00	46.00	LP002.
5.0 -30.0	60.00	50.00	LP002.

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

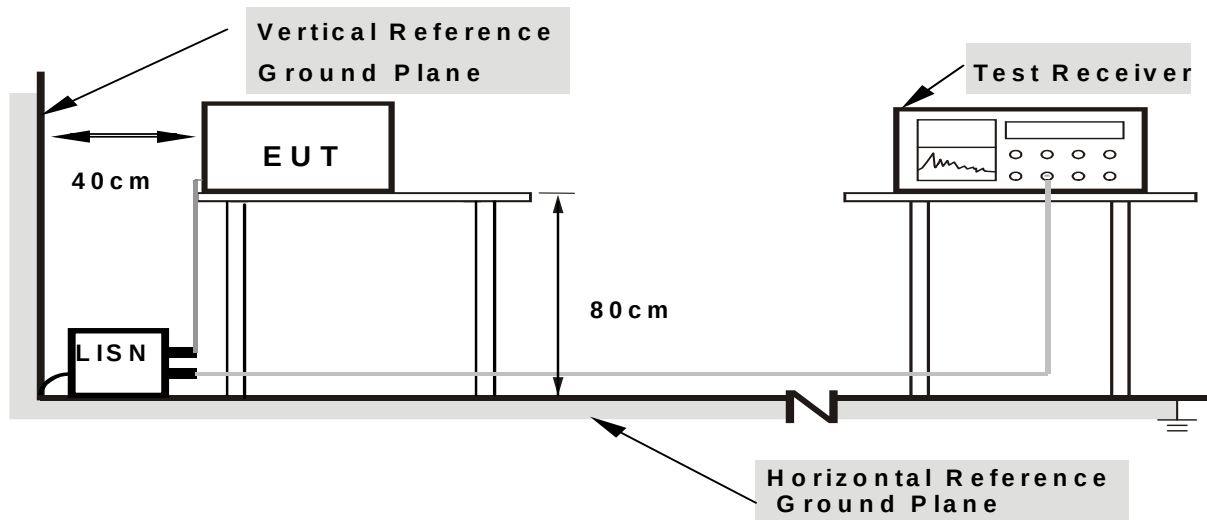
3.2.2 TEST PROCEDURE

- The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.2.3 DEVIATION FROM TEST STANDARD

No deviation

3.2.4 TEST SETUP



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.2.5 TEST RESULT

Battery powered, not was required.

3.3 RADIATED EMISSION MEASUREMENT

3.3.1 Radiated Emission Limits (FCC 15.209)

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission level (dBuV/m)=20log Emission level (uV/m).

LIMITS OF RADIATED EMISSION MEASUREMENT (FCC 15.249)

Frequency of Emission (MHz)	Field Strength of fundamental ((millivolts /meter)	Field Strength of Harmonics (microvolts/meter)
902-928 MHz	50	500

Notes:

- (1) 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 Section 15.209, whichever is the lesser attenuation.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1MHz / 1MHz for Peak

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.3.2 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.
- 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.

Note:

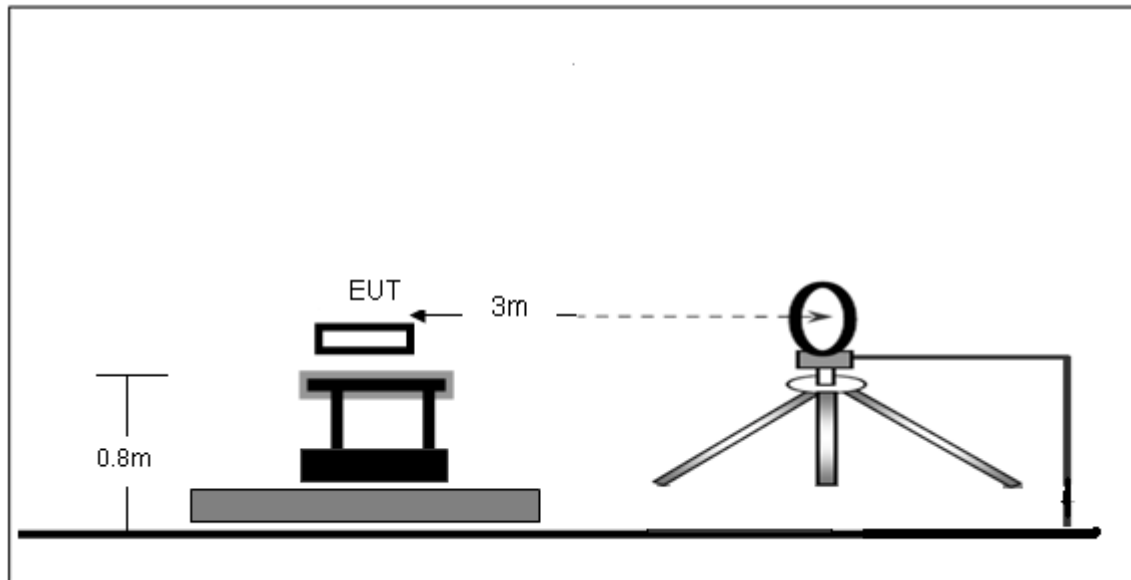
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

3.3.3 DEVIATION FROM TEST STANDARD

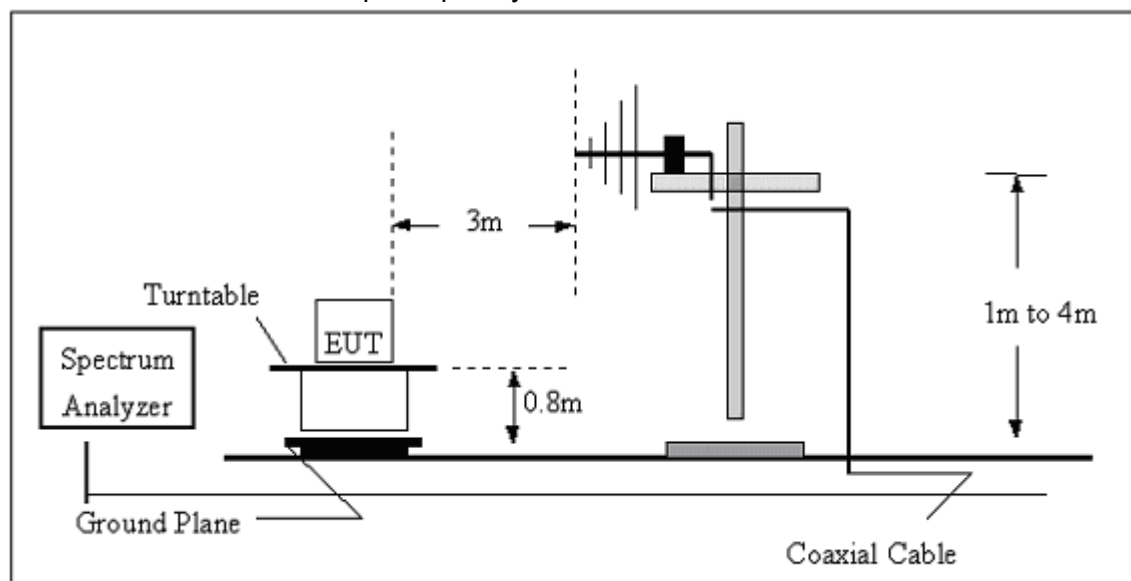
No deviation

3.3.4 TEST SETUP

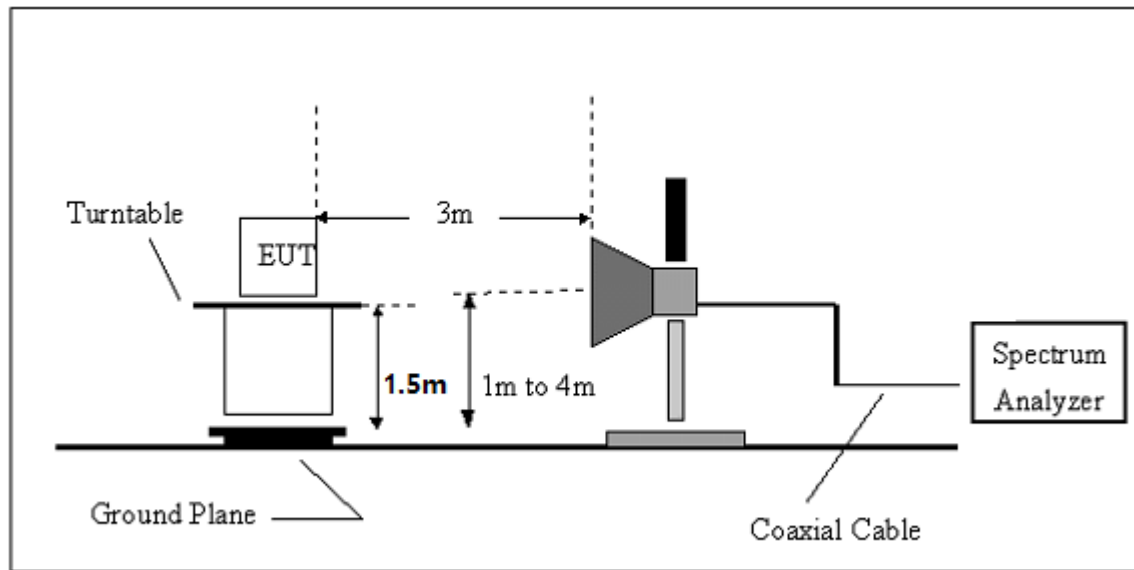
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



3.3.5 TEST RESULTS (BLOW 30MHz)

EUT :	RFID Tag	Model Name. :	SAAT-T815A
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance/test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

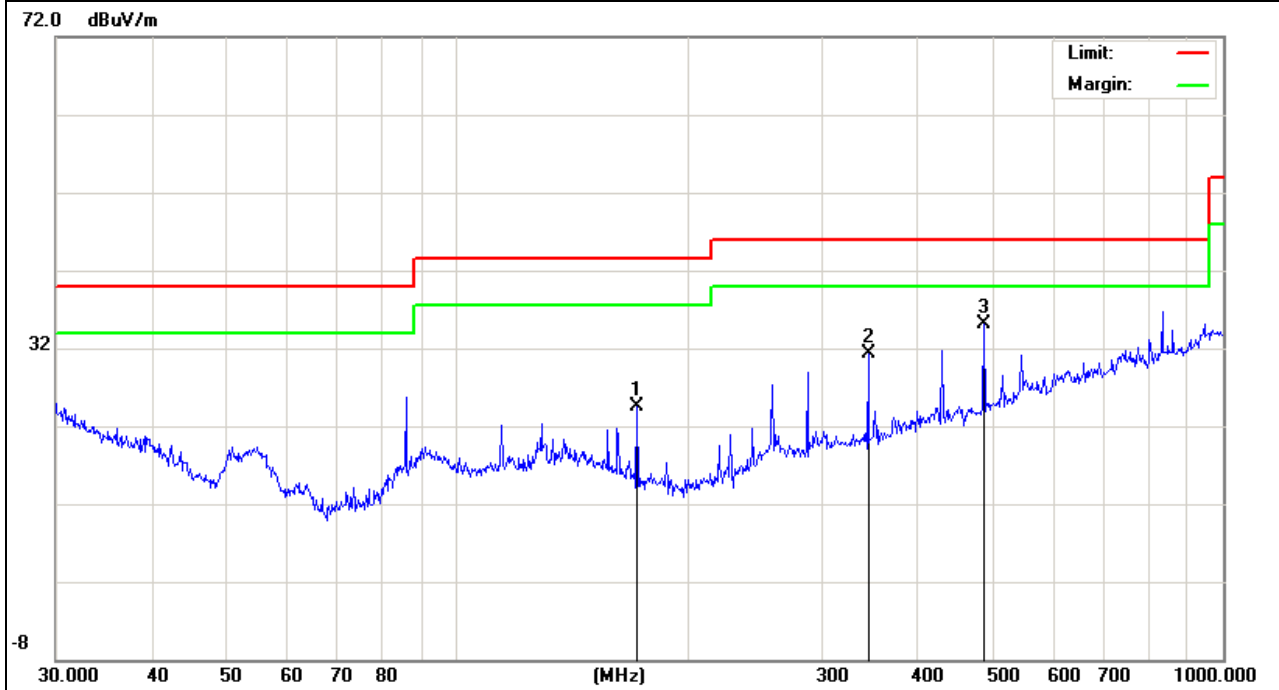
3.3.6 TEST RESULTS (BETWEEN 30 – 1000 MHZ)

EUT :	RFID Tag	Model Name :	SAAT-T815A
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
171.9945	14.6	9.89	24.49	43.5	-19.01	QP
344.3854	16.17	15.22	31.39	46	-14.61	QP
487.315	16.08	19.01	35.09	46	-10.91	QP

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

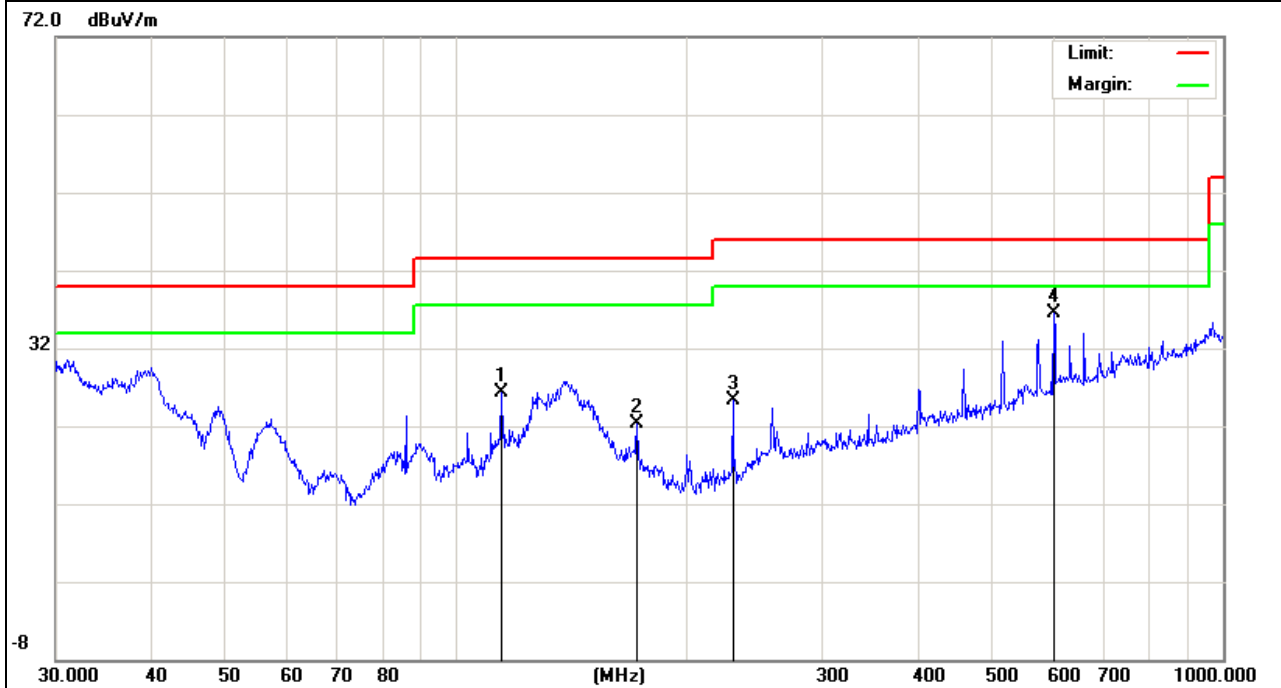


EUT :	RFID Tag	Model Name :	SAAT-T815A
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
114.5146	14.58	11.66	26.24	43.5	-17.26	QP
171.9945	12.46	9.89	22.35	43.5	-21.15	QP
229.2931	14.95	10.39	25.34	46	-20.66	QP
601.4265	15.29	21.15	36.44	46	-9.56	QP

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Horizontal

Freq. (MHz)	Reading (dBμV)	AF (dB/m)	Cable Loss (dB)	Pre-amp (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)
916.00	86.56	23.11	5.95	24.41	0.00	91.21	94.00	-2.79	P

Vertical

Freq. (MHz)	Reading (dBμV)	AF (dB/m)	Cable Loss (dB)	Pre-amp (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)
916.00	83.23	23.11	5.95	24.41	0.00	87.88	94.00	-6.12	P

Remark:

Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).

Emission Level is less(PK) than QP Limits,No need QP level.

3.3.7 TEST RESULTS (ABOVE 1000 MHZ)

Horizontal

Freq. (MHz)	Reading (dBμV)	AF (dB/m)	Cable Loss (dB)	Pre-amp (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)
1832.83	64.49	29.14	2.21	48.33	0.30	47.81	74.00	-26.19	P
1832.83	53.93	29.14	2.21	48.33	0.30	37.26	54.00	-16.74	A
2748.23	55.72	30.38	2.77	47.29	0.30	41.88	74.00	-32.12	P
2748.23	45.16	30.38	2.77	47.29	0.30	31.32	54.00	-22.68	A
3664.58	56.84	31.04	3.23	47.60	0.30	43.81	74.00	-30.19	P
3664.58	46.28	31.04	3.23	47.60	0.30	33.25	54.00	-20.75	A
N/A	---	---	---	---	---	---	---	---	---

Vertical

Freq. (MHz)	Reading (dBμV)	AF (dB/m)	Cable Loss (dB)	Pre-amp (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)
1832.83	66.86	29.14	2.21	48.33	0.30	50.18	74.00	-23.82	P
1832.83	56.30	29.14	2.21	48.33	0.30	39.63	54.00	-14.37	A
2748.23	54.64	30.38	2.77	47.29	0.30	40.80	74.00	-33.20	P
2748.23	44.08	30.38	2.77	47.29	0.30	30.24	54.00	-23.76	A
3664.58	57.56	31.04	3.23	47.60	0.30	44.53	74.00	-29.47	P
3664.58	47.00	31.04	3.23	47.60	0.30	33.97	54.00	-20.03	A
N/A	---	---	---	---	---	---	---	---	---

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m). Peak detector mode and average detector mode of the emission shown in Result column.

Band Edge Emission:

Due to the operating frequency of this EUT is 908.42MHz only, and its 20dB BW is just 122.5kHz, the Band Edge is not required because the allowed frequency band is 902~928MHz.

4. 20DB BANDWIDTH TEST

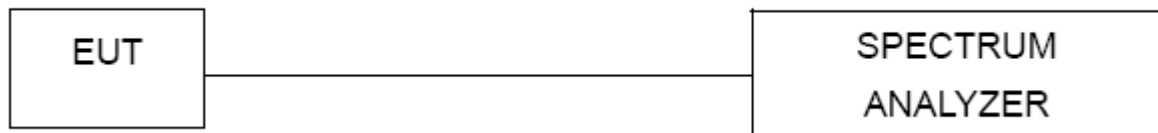
4.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting : RBW= 10KHz, VBW $\geq$ RBW, Sweep time = Auto.

4.2 DEVIATION FROM STANDARD

No deviation.

4.3 TEST SETUP



4.4 TEST RESULTS

EUT :	RFID Tag	Model Name :	SAAT-T815A
Temperature :	26 °C	Relative Humidity :	53%
Pressure :	1020 hPa	Test Power :	DC 3.7V
Test Mode :	TX		

Frequency (MHz)	20 dBc Bandwidth (KHz)
916	122.5

