FCC RADIO TEST REPORT
FCC ID: 2AFPU-ATS-UCOWS002

Product	UCOWS Cow Activity Reader
Trade Name	UCOWS
Model No	ATS-UCOWS002
Serial Model	N/A

Applicant's name	Yinchuan aotoso Information Technology Co Ltd.
Address	Bldg No. 1,SME Business Imbark Center, shuixiang Road, Yinchuan, Ningxia.,

Prepared By	Nowd Testing Services Co.,Ltd. No. 606, FuerYuanjian Business Centre, 25 Zone, Bao'an District, Shenzhen, Guandong
Tel	(86) 755-27830065
Fax	(86) 755-27830095

Report No.	NTS 150614059R
Date of Test	Jun.14, 2015
Date of Rep.	Jul. 20, 2015

TEST RESULT CERTIFICATION

Applicant's name ..... Yinchuan aotoso Information Technology Co Ltd.

Address ..... Bldg No. 1,SME Business Imbark Center, shuixiang Road, Yinchuan, Ningxia.,

Manufacture's Name ... Yinchuan aotoso Information Technology Co Ltd.

Address ..... Bldg No. 1,SME Business Imbark Center, shuixiang Road, Yinchuan, Ningxia.,

Product description

Product name.....UCOWS Cow Activity Reader

Model and/or type reference ATS-UCOWS002

Serial Model ..... N/A

Standards ..... FCC Part15.249 01 Oct. 2014

Test procedure ..... ANSI C63.10-2013

This device described above has been tested by Nowd Testing Services Co., Ltd., 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.

This report shall not be reproduced except in full, without the written approval of Nowd Testing Services Co., Ltd., this document may be altered or revised by ShenZhen Nowd Testing Services Co., Ltd., personal only, and shall be noted in the revision of the document.

Date of Test .....

Date (s) of performance of tests..... 14 Jun. 2015 ~20 Jul. 2015

Date of Issue..... 20 Jul. 2015

Test Result..... **Pass**

Prepared by: jack

Jack Wu
Testing Engineer

Reviewed by: Andy

Andy Xie
Technical Manager

Approved by: somnus

somnus
Authorized Signatory

Table of Contents Page

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	Pass	
15.203	Antenna Requirement	Pass	
15.249	Radiated Spurious Emission	Pass	
15.205	Band Edge Emission	Pass	
15.249	Occupied Bandwidth	Pass	

1.1 TEST FACILITY

Nowd Testing Services Co.,Ltd.
Add. : No. 606, FuerYuanjian Business Centre, 25 Zone, Bao'an District,
Shenzhen, Guandong
FCC Registration No.:230614;

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y ± U**，where expended 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	±1.38dB
2	RF power,conducted	±0.16dB
3	Spurious emissions,conducted	±0.21dB
4	All emissions,radiated(<1G)	±4.68dB
5	All emissions,radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	UCOWS Cow Activity Reader
Trade Name	UCOWS
Model Name	ATS-UCOWS002
Serial Model	N/A
Model Difference	N/A
Product Description	The EUT is a UCOWS Cow Activity Reader Operation Frequency: 2475MHz Modulation Type: QPSK Antenna Designation: Omnidirectional antenna Antenna Gain(Peak) 3.0 dBi 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.
Channel List	Please refer to the Note 2.
Ratings	AC 120V
Battery	N/A

Note:

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

2.

Channel	Frequency (MHz)
01	2475

3.

Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	N/A	N/A	Omnidirectional antenna	SMA connector	3.0	Antenna

`

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	Link Mode
Mode 2	CH 01
Mode 3	CH 02
Mode 4	CH 03

For Conducted Emission	
Final Test Mode	Description
Mode 1	Link Mode

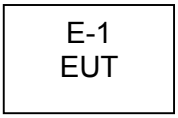
For Radiated Emission	
Final Test Mode	Description
Mode 1	Link Mode

Note:

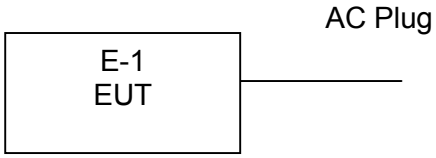
(1) The measurements are performed at the highest, middle, lowest available channels.

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test



Conducted Emission Test



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	UCOWS Cow Activity Reader	UCOWS	ATS-UCOWS002	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

Equipment list Radiation test & other conducted test

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	160400005	2015.07.06	2016.07.05	1 year
2	Test Receiver	R&S	ESPI7	101318	2015.06.07	2016.06.06	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2015.07.06	2016.07.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2015.06.07	2016.06.06	1 year
5	Spectrum Analyzer	ADVANTEST	R3182	150900201	2015.06.07	2016.06.06	1 year
6	Horn Antenna	EM	EM-AH-10180	2011071402	2015.07.06	2016.07.05	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2015.07.06	2016.07.05	1 year
8	Amplifier	EM	EM-30180	060538	2014.12.22	2015.12.21	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2015.06.08	2016.06.07	1 year
10	Power Meter	R&S	NRVS	100696	2015.07.06	2016.07.05	1 year
11	Test Cable 10MHz-1GHz	ElectricFever	R-01	1259400	2015.07.06	2016.07.05	1 year
12	Test Cable 1-25GHz	ElectricFever	R-02	1258670	2015.07.06	2016.07.05	1 year

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2015.06.06	2016.06.05	1 year
2	LISN	R&S	ENV216	101313	2014.08.24	2015.08.23	1 year
3	LISN	Kyoritsu	KNW-407	8-1789-3	2014.08.24	2015.08.23	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2015.06.07	2016.06.06	1 year
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	2015.06.07	2016.06.06	1 year
6	Absorbing clamp	R&S	MDS-21	100423	2015.06.08	2016.06.07	1 year
7	Test Cable 150KHz-30MHz	NTS	C01	01	2015.05.14	2016.05.13	1 year

3. ANTENNA REQUIREMENT

3.1 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.

3.2 EUT ANTENNA

The EUT antenna is permanent attached antenna. It comply with the standard requirement.

3.3 CONDUCTED EMISSION MEASUREMENT

3.3.1 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

`

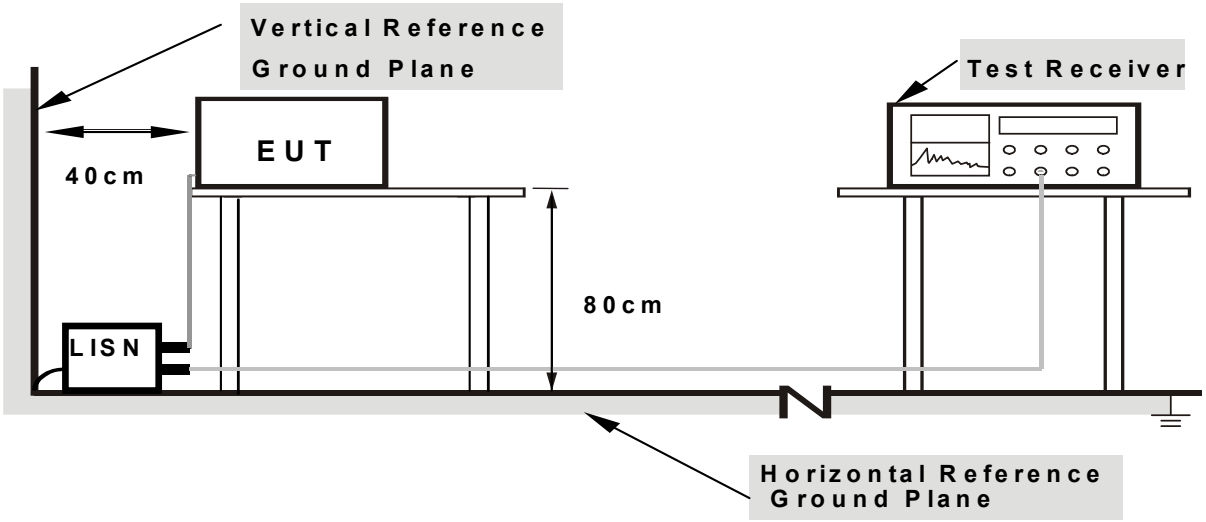
3.3.2 TEST PROCEDURE

a. 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.
b. 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.
c. 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.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.3.3 DEVIATION FROM TEST STANDARD

No deviation

3.3.4 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

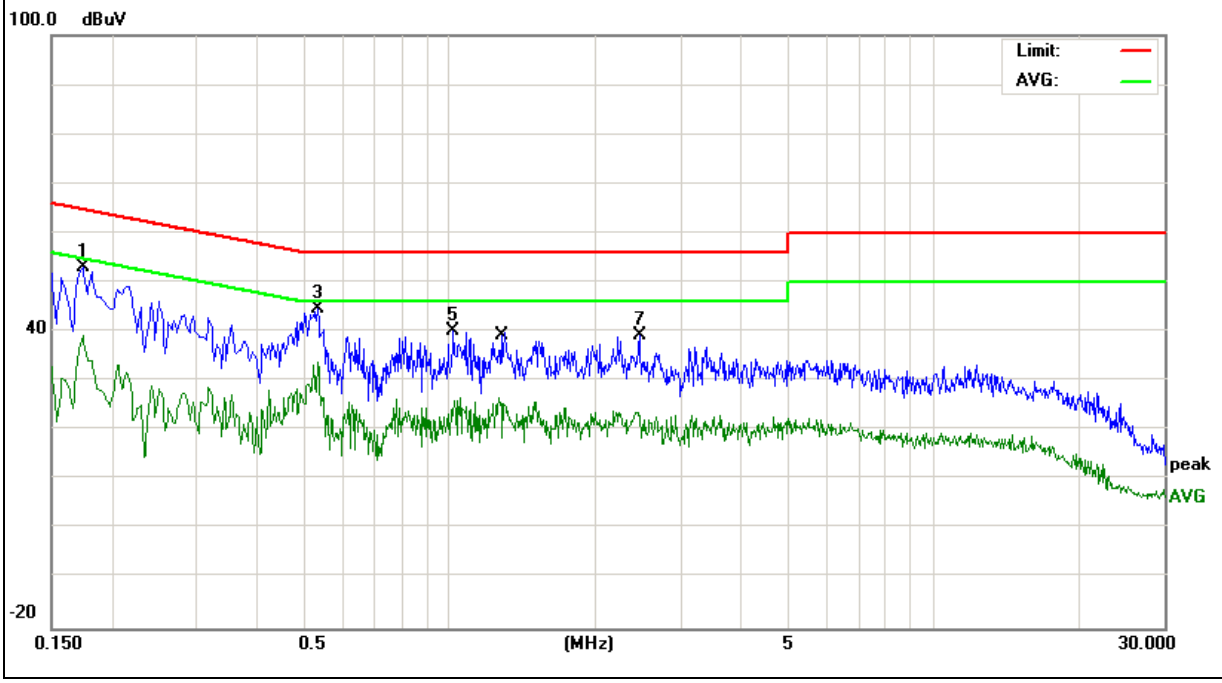
3.2.5 TEST RESULT

EUT：	UCOWS Cow Activity Reader	Model Name. ：	ATS-UCOWS002
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	AC 120V/60Hz	Test Mode：	Mode 1

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1740	43.49	9.62	53.11	64.76	-11.65	QP
0.1740	29.73	9.62	39.35	54.76	-15.41	AVG
0.5340	34.99	9.77	44.76	56.00	-11.24	QP
0.5340	24.05	9.77	33.82	46.00	-12.18	AVG
1.0180	30.53	9.73	40.26	56.00	-15.74	QP
1.2660	16.92	9.71	26.63	46.00	-19.37	AVG
2.4700	29.45	9.66	39.11	56.00	-16.89	QP

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

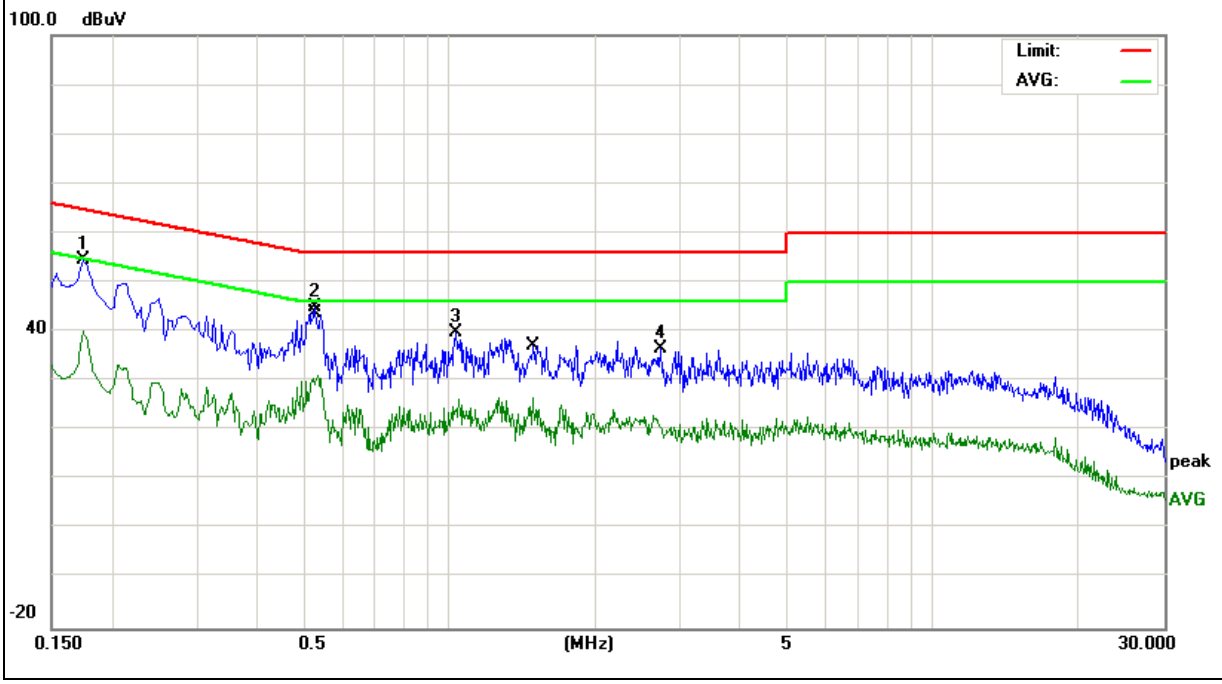


EUT：	UCOWS Cow Activity Reader	Model Name. ：	ATS-UCOWS002
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	AC 120V/60Hz	Test Mode：	Mode 1

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1740	44.87	9.61	54.48	64.76	-10.28	QP
0.5260	35.26	9.68	44.94	56.00	-11.06	QP
1.0300	30.23	9.61	39.84	56.00	-16.16	QP
2.7220	27.02	9.53	36.55	56.00	-19.45	QP
0.1740	30.61	9.61	40.22	54.76	-14.54	AVG
0.5340	21.40	9.67	31.07	46.00	-14.93	AVG
1.4819	17.02	9.58	26.60	46.00	-19.40	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



3.4 RADIATED EMISSION MEASUREMENT

3.4.1 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
Frequency (MHz)	Limit (dBuV)	
30~88	40	3
88~216	43.5	3
216~960	46	3
960 -10000	54.00	3
*902 - 928	94.00	3

Note:

(1) The tighter limit applies at the band edges.

(2) Emission level (dBuV/m)=20log Emission level (uV/m).

(3) *Note: This is the limit for the fundamental frequency.

LIMITS OF RADIATED EMISSION MEASUREMENT (FCC 15.249)

Frequency of Emission (MHz)	Field Strength of fundamental ((millivolts /meter)	Field Strength of Harmonics (microvolts/meter)
2400-2483.5	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

3.4.2 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 m for below 1GHz and 1.5m for above 1GHz the ground at a 3 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 for below 1GHz and 1.5m for above 1GHz; 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.

Note:

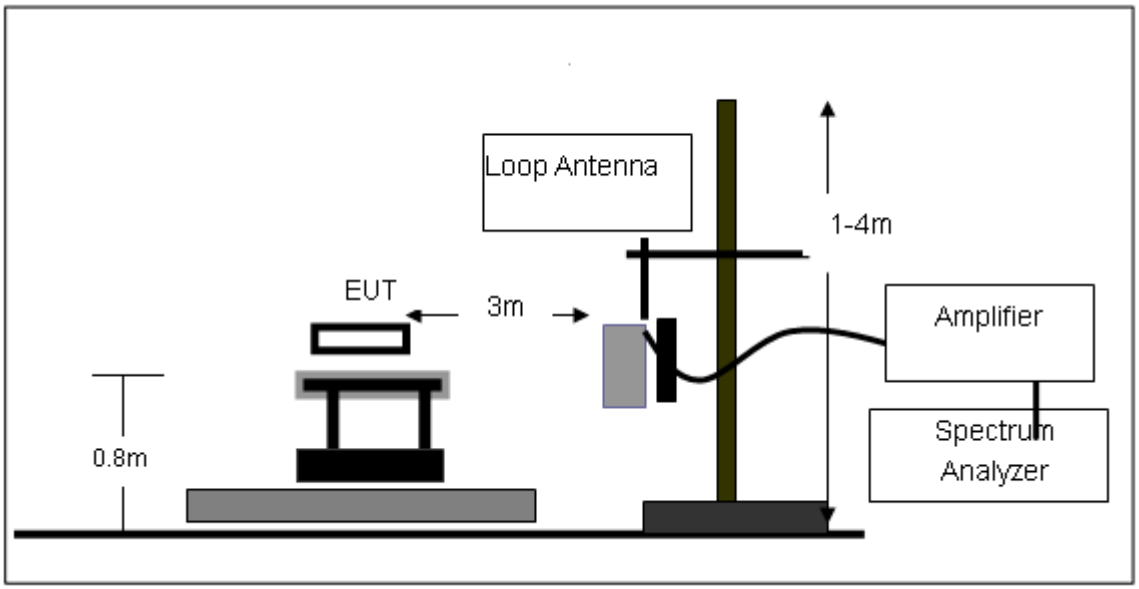
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

3.4.3 DEVIATION FROM TEST STANDARD

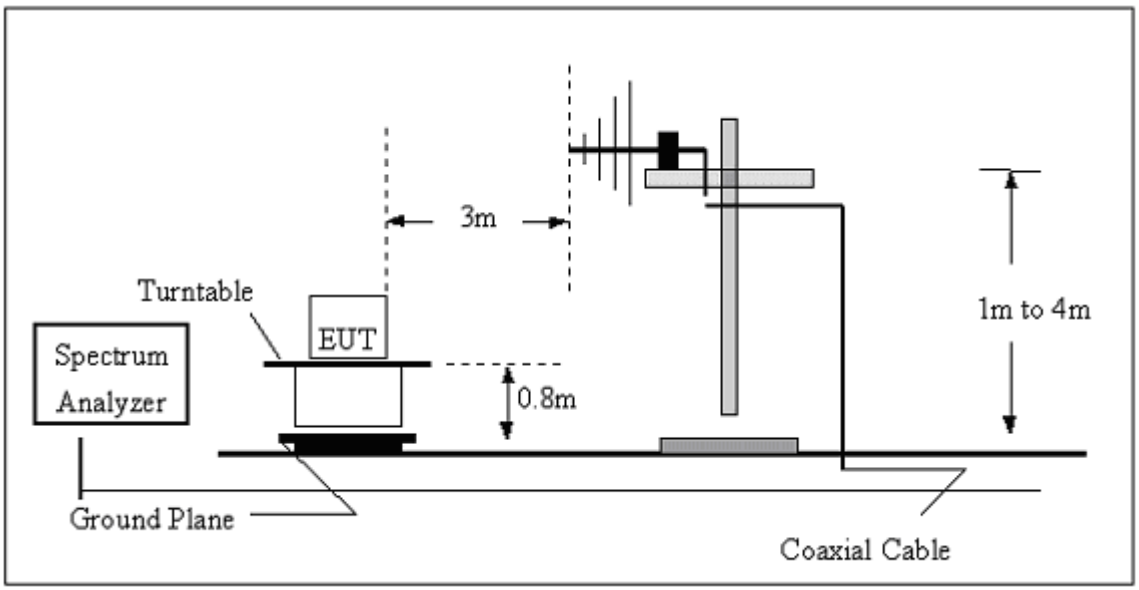
No deviation

3.4.4 TEST SETUP

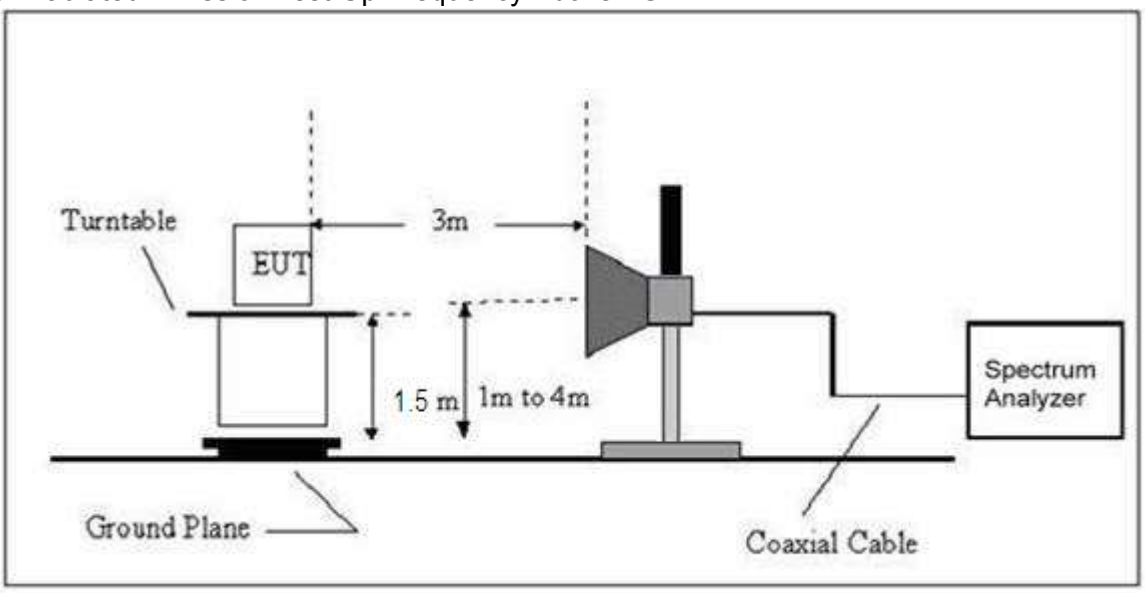
（A）Radiated Emission Test-Up Frequency Below 30MHz



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



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



3.4.5 TEST RESULTS (BLOW 30MHz)

EUT：	UCOWS Cow Activity Reader	Model Name. ：	ATS-UCOWS002
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	--
Test Mode ：	TX	Polarization :	--

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

NOTE:

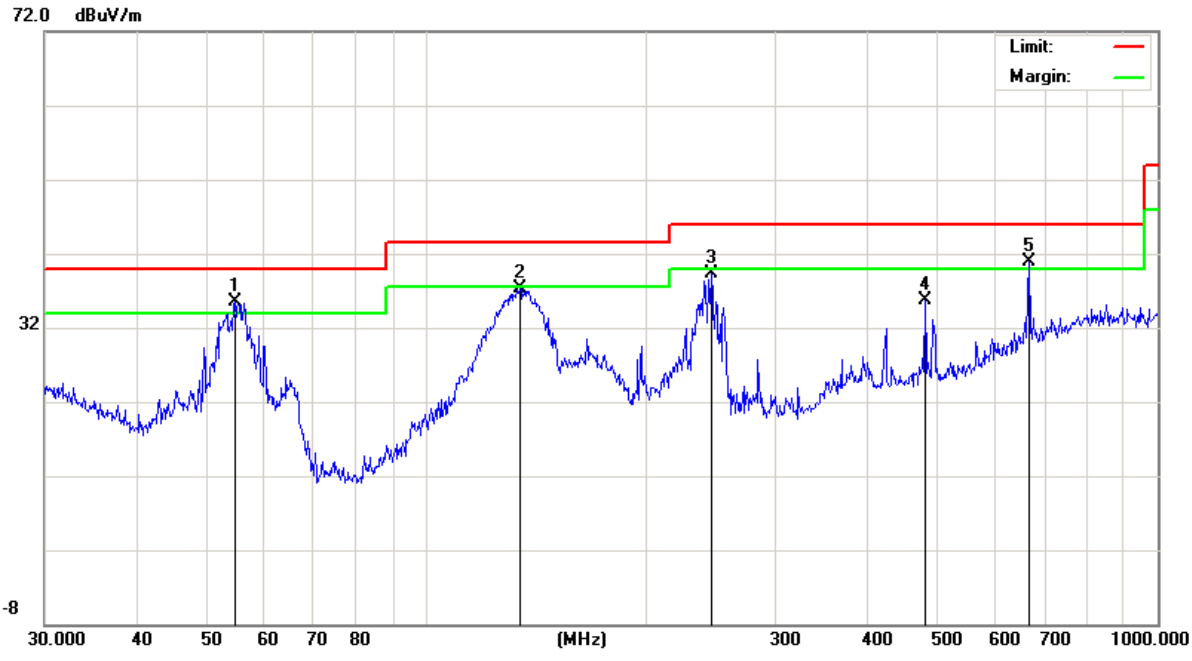
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =20 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

3.4.6 TEST RESULTS (BETWEEN 30 – 1000 MHZ)

EUT：	UCOWS Cow Activity Reader	Model Name ：	ATS-UCOWS002
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	AC 120V
Test Mode ：	TX	Polarization：	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
54.6428	26.23	9.37	35.60	40.00	-4.40	QP
134.0882	25.52	11.70	37.22	43.50	-6.28	QP
245.0900	25.72	13.54	39.26	46.00	-6.74	QP
480.5276	15.77	19.91	35.68	46.00	-10.32	QP
668.1422	17.04	23.91	40.95	46.00	-5.05	QP

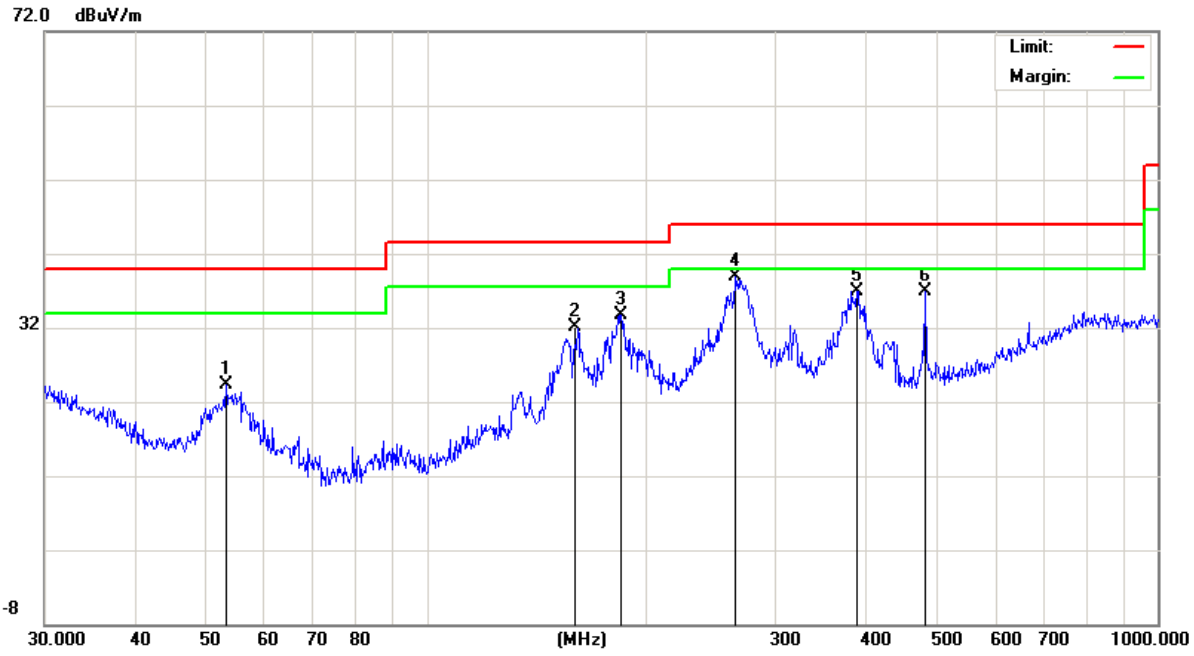
Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	UCOWS Cow Activity Reader	Model Name ：	ATS-UCOWS002
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	AC 120V
Test Mode ：	TX	Polarization：	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
53.1313	14.46	9.80	24.26	40.00	-15.74	QP
158.6676	21.60	10.47	32.07	43.50	-11.43	QP
184.4898	23.06	10.66	33.72	43.50	-9.78	QP
264.7457	25.12	13.75	38.87	46.00	-7.13	QP
387.9920	19.13	17.81	36.94	46.00	-9.06	QP
480.5276	17.03	19.91	36.94	46.00	-9.06	QP

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

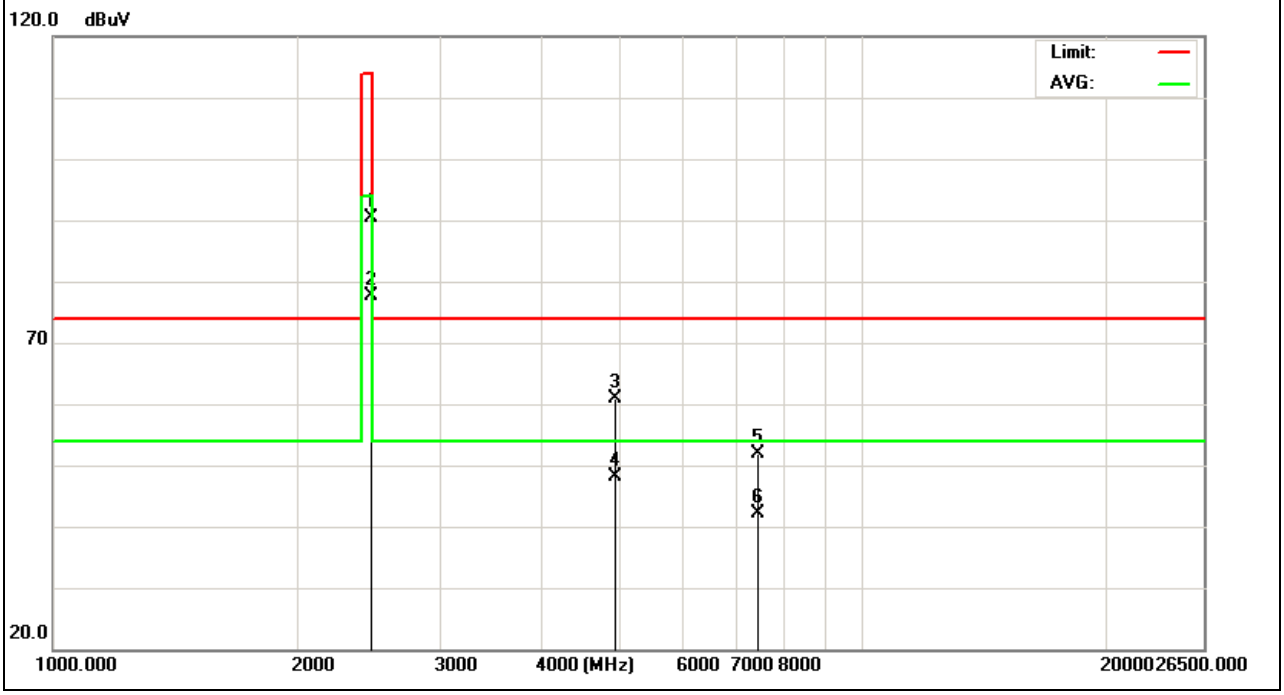


3.4.7 TEST RESULTS (ABOVE 1000 MHZ)

EUT：	UCOWS Cow Activity Reader	Model Name ：	ATS-UCOWS002
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	AC 120V
Test Mode ：	TX-2475MHz	Polarization：	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2475.136	103.13	-12.82	90.31	114.00	-23.69	peak
2475.136	90.35	-12.82	77.53	94.00	-16.47	AVG
4950.204	64.47	-3.53	60.94	74.00	-13.06	peak
4950.204	51.70	-3.53	48.17	54.00	-5.83	AVG
7425.311	52.66	-0.85	51.81	74.00	-22.19	peak
7425.311	43.08	-0.85	42.23	54.00	-11.77	AVG

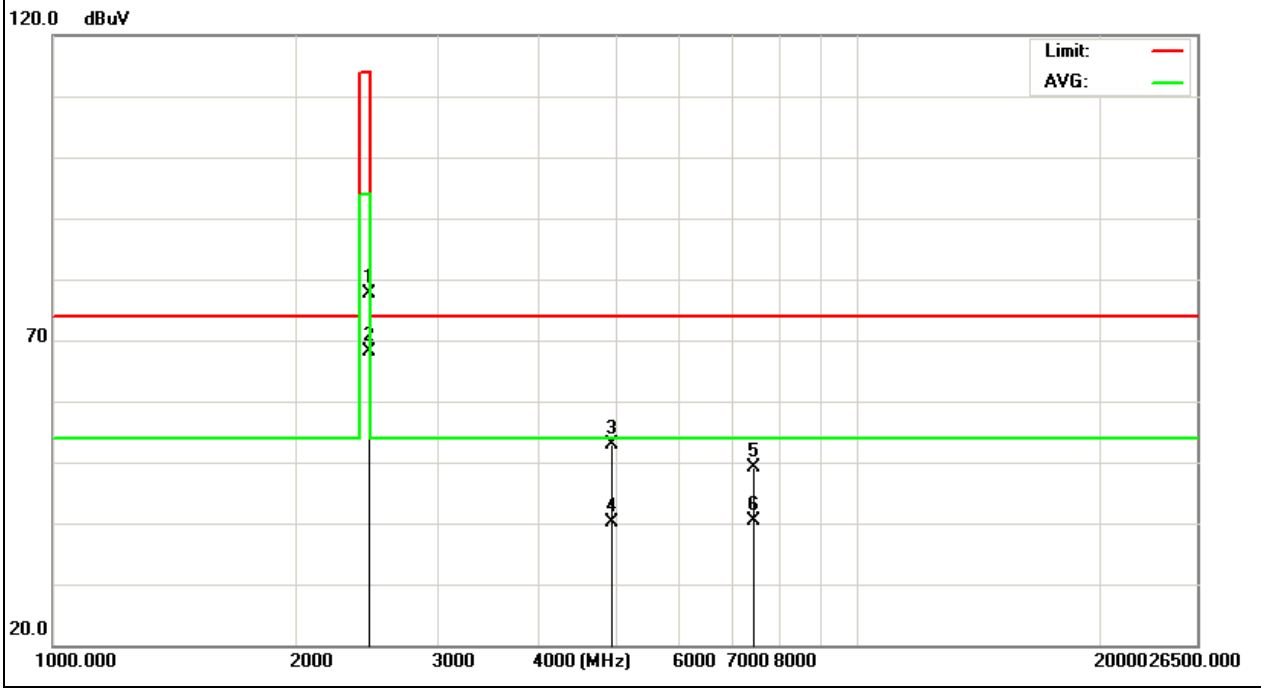
Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
No emission above 18GHz.



EUT：	UCOWS Cow Activity Reader	Model Name ：	ATS-UCOWS002
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	AC 120V
Test Mode ：	TX-2475MHz	Polarization：	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2475.136	90.36	-12.82	77.54	114.00	-36.46	peak
2475.136	81.03	-12.82	68.21	94.00	-25.79	AVG
4950.204	56.51	-3.53	52.98	74.00	-21.02	peak
4950.204	43.57	-3.53	40.04	54.00	-13.96	AVG
7425.311	50.03	-0.85	49.18	74.00	-24.82	peak
7425.311	41.28	-0.85	40.43	54.00	-13.57	AVG

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
No emission above 18GHz.



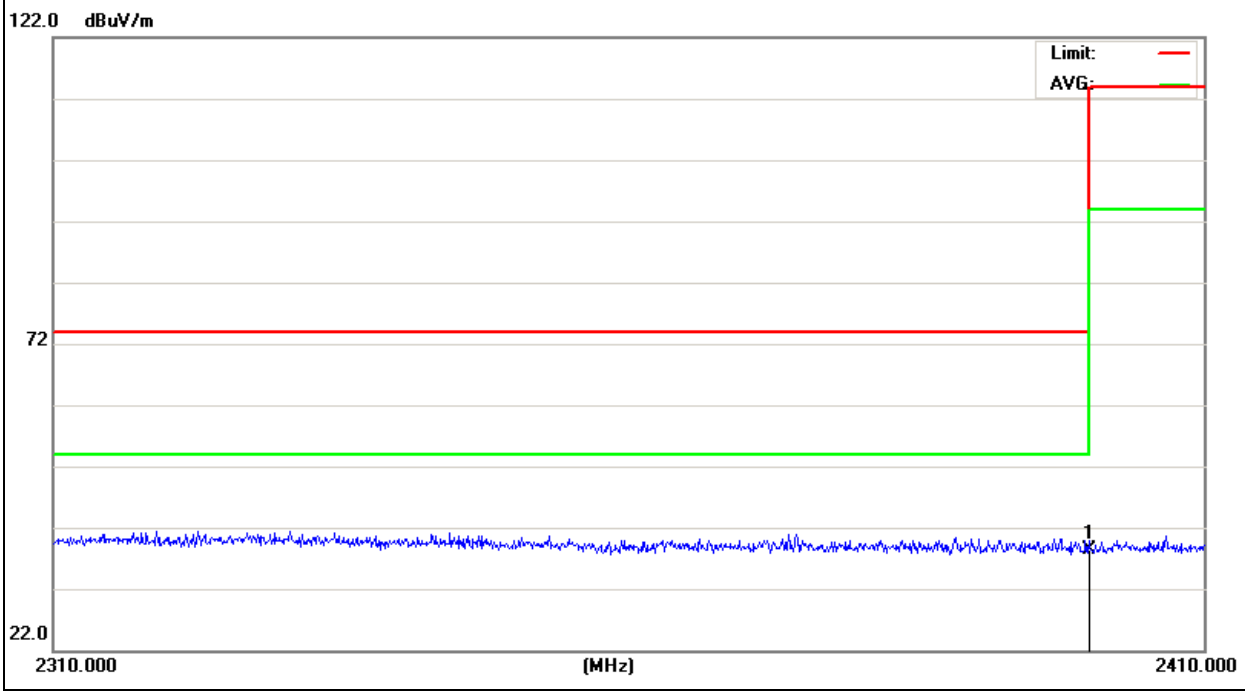
Note: EUT Pre-scan X/Y/Z orientation, only worst case is presented in the report(X orientation).

3.4.8 TEST RESULTS (RESTRICTED BANDS REQUIREMENTS)

EUT：	UCOWS Cow Activity Reader	Model Name ：	ATS-UCOWS002
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	AC 120V
Test Mode ：	TX-2475MHz	Polarization：	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2400.000	41.48	-3.11	38.37	74.00	-35.63	peak

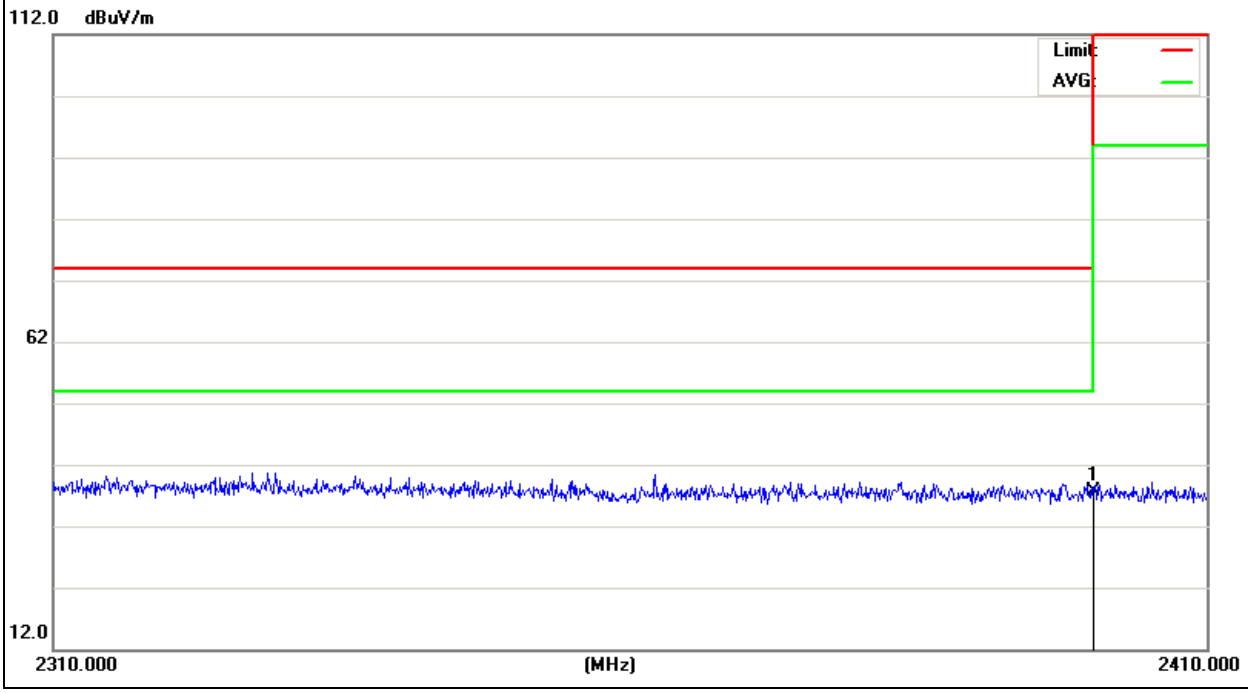
Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	UCOWS Cow Activity Reader	Model Name ：	ATS-UCOWS002
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	AC 120V
Test Mode ：	TX-2475MHz	Polarization：	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2400.000	40.81	-3.11	37.70	74.00	-36.30	peak

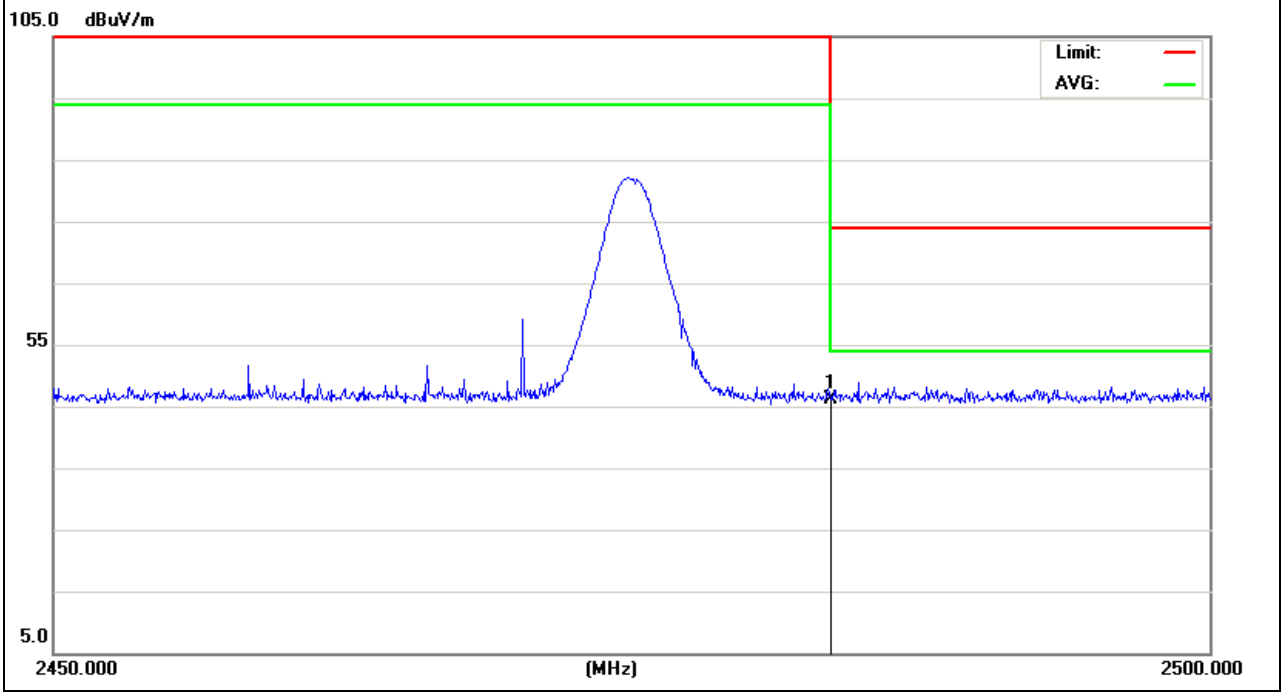
Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	UCOWS Cow Activity Reader	Model Name ：	ATS-UCOWS002
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	AC 120V
Test Mode ：	TX-2475MHz	Polarization：	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.500	49.64	-3.57	46.07	74.00	-27.93	peak

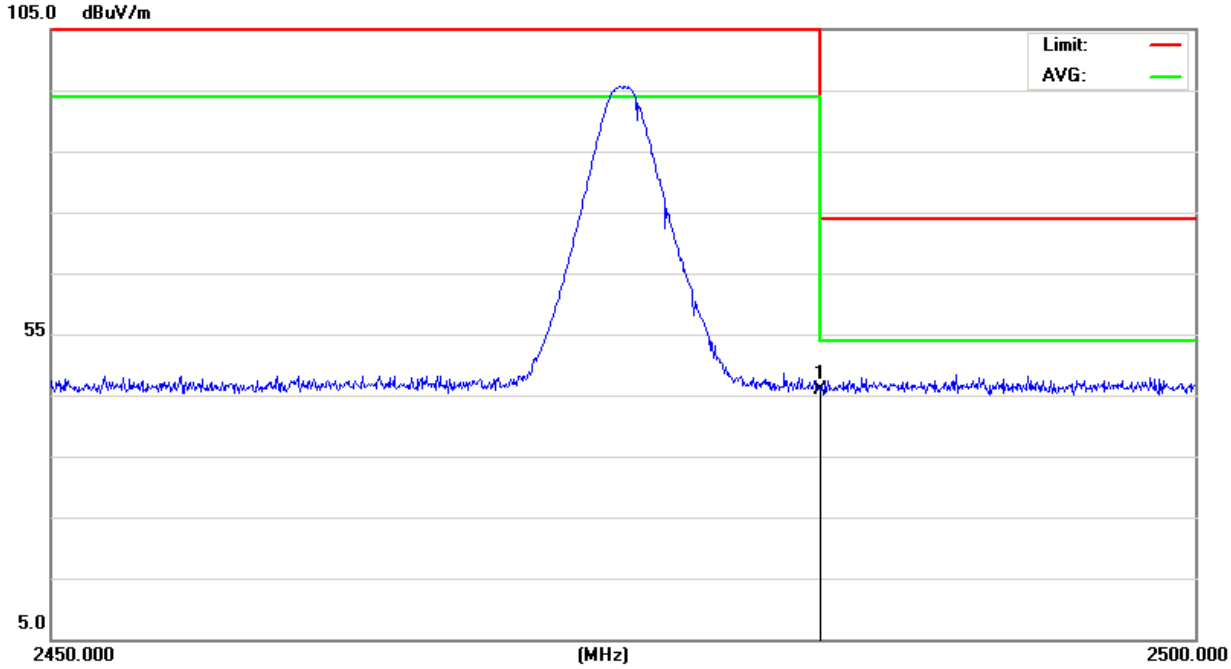
Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	UCOWS Cow Activity Reader	Model Name ：	ATS-UCOWS002
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	AC 120V
Test Mode ：	TX-2475MHz	Polarization：	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.500	49.52	-3.57	45.95	74.00	-28.05	peak

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.



4. BANDWIDTH TEST

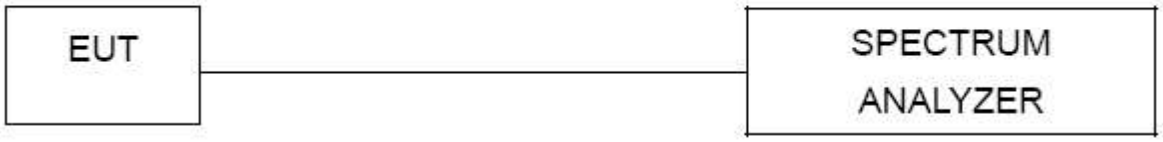
4.1 TEST PROCEDURE

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= 100KHz, VBW≧RBW, Sweep time = Auto.

4.2 DEVIATION FROM STANDARD

No deviation.

4.3 TEST SETUP

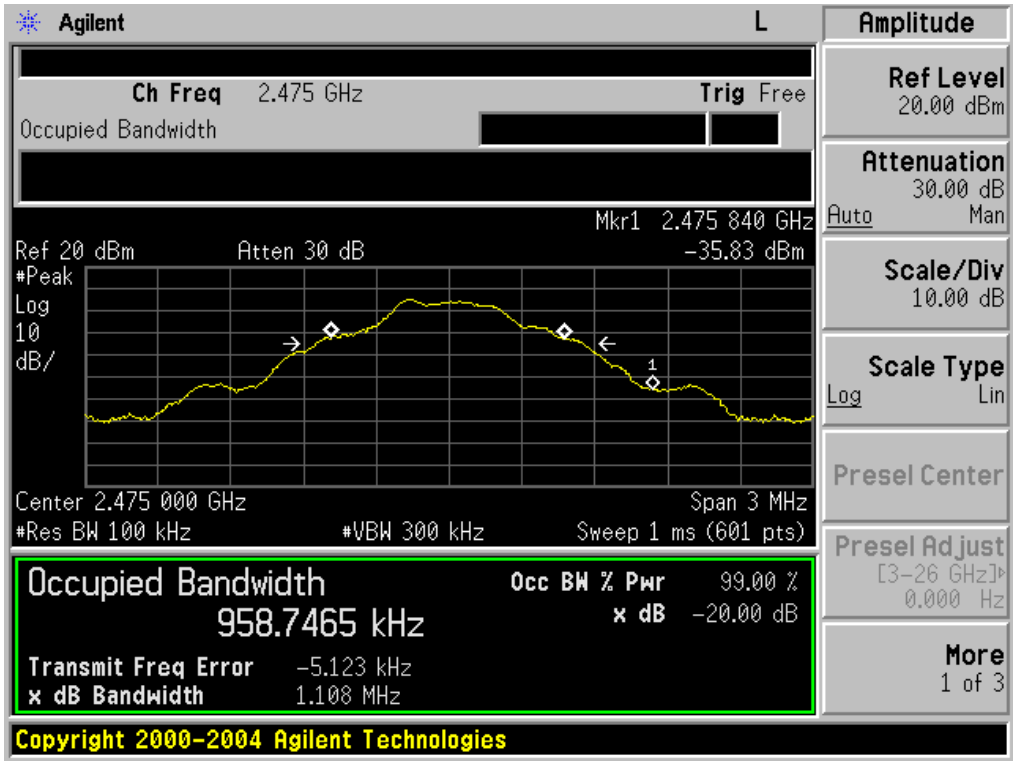


4.4 TEST RESULTS

EUT：	UCOWS Cow Activity Reader	Model Name ：	ATS-UCOWS002
Temperature：	26 ℃	Relative Humidity：	53%
Pressure：	1020 hPa	Test Power ：	AC 120V
Test Mode ：	TX		

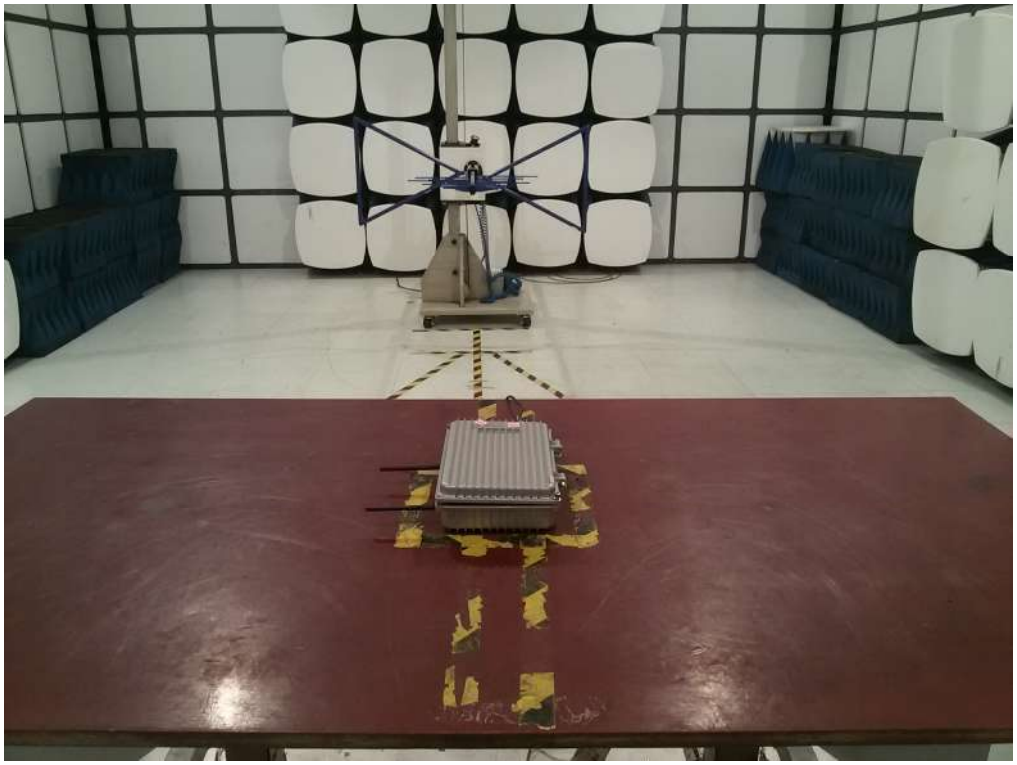
Test Channel	Frequency (MHz)	20 dBc Bandwidth (MHz)
CH01	2475	1.108

CH01



5. EUT TEST PHOTO

Radiated Measurement Photos



Conducted Measurement Photos

`