



FCC RADIO TEST REPORT-WIFI

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 150614058R

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 Part 15.247

Test procedure..... ANSI C63.4-2003 and KDB 558074 D01 DTS Meas Guidance v03r03

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 Wu
Testing Engineer

Reviewed by:



Andy Xie
Technical Manager

Approved by:



somnus
Authorized Signatory

Table of Contents

	Page
1 . SUMMARY OF TEST RESULTS	5
1.1 TEST FACILITY	6
1.2 MEASUREMENT UNCERTAINTY	6
2 . GENERAL INFORMATION	7
2.1 GENERAL DESCRIPTION OF EUT	7
2.2 DESCRIPTION OF TEST MODES	9
2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	11
2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)	12
2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS	13
3 . EMC EMISSION TEST	14
3.1 CONDUCTED EMISSION MEASUREMENT	14
3.1.1 POWER LINE CONDUCTED EMISSION LIMITS	14
3.1.2 TEST PROCEDURE	15
3.1.3 DEVIATION FROM TEST STANDARD	15
3.1.4 TEST SETUP	15
3.1.5 EUT OPERATING CONDITIONS	15
3.1.6 TEST RESULTS	16
3.2 RADIATED EMISSION MEASUREMENT	18
3.2.1 RADIATED EMISSION LIMITS	18
3.2.2 TEST PROCEDURE	19
3.2.3 DEVIATION FROM TEST STANDARD	19
3.2.4 TEST SETUP	20
3.2.5 EUT OPERATING CONDITIONS	21
3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)	22
3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)	23
3.2.8 TEST RESULTS (ABOVE 1000 MHZ)	25
4 . POWER SPECTRAL DENSITY TEST	26
4.1 APPLIED PROCEDURES / LIMIT	26
4.1.1 TEST PROCEDURE	26
4.1.2 DEVIATION FROM STANDARD	26
4.1.3 TEST SETUP	26
4.1.4 EUT OPERATION CONDITIONS	26
4.1.5 TEST RESULTS	27
5 . BANDWIDTH TEST	35
5.1 APPLIED PROCEDURES / LIMIT	35

Table of Contents	Page
5.1.1 TEST PROCEDURE	35
TEST SETUP	35
5.1.2 EUT OPERATION CONDITIONS	35
5.1.3 TEST RESULTS	36
6 . PEAK OUTPUT POWER TEST	44
6.1 APPLIED PROCEDURES / LIMIT	44
6.1.1 TEST PROCEDURE	44
6.1.2 DEVIATION FROM STANDARD	44
6.1.3 TEST SETUP	44
6.1.4 EUT OPERATION CONDITIONS	44
6.1.5 TEST RESULTS	45
7 . 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE	46
7.1 DEVIATION FROM STANDARD	46
7.2 TEST SETUP	46
7.3 EUT OPERATION CONDITIONS	46
7.4 TEST RESULTS	47
8 . ANTENNA REQUIREMENT	52
8.1 STANDARD REQUIREMENT	52
8.2 EUT ANTENNA	52
9 . EUT TEST PHOTO	53
APPENDIX-PHOTOGRAPHS OF EUT CONSTRUCTIONAL DETAILS	

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247 (a)(2)	6dB Bandwidth	PASS	
15.247 (b)	Peak Output Power	PASS	
15.247 (c)	Radiated Spurious Emission	PASS	
15.247 (d)	Power Spectral Density	PASS	
15.205&15.209	Band Edge Emission	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

(1) "N/A" denotes test is not applicable in this Test Report

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 $y \pm U$, 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	$\pm 1.38\text{dB}$
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	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:	802.11b/g/n(20MHz): 2412~2462MHz 802.11n(40MHz):2422~2452MHz
	Modulation Type:	802.11b: DSSS (BPSK/QPSK/CCK) 802.11g/n: OFDM (BPSK/QPSK/16QAM/64QAM)
	Bit Rate of Transmitter	802.11b:11/5.5/2/1 Mbps 802.11g:54/48/36/24/18/12/9/6Mbps 802.11n(20MHz/40MHz): up to 150 Mbps
	Number Of Channel	802.11b/g/n20MHz:11CH 802.11n40MHz:7CH
	Antenna Designation:	Please see Note 3.
	Antenna Gain (dBi)	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	
Connecting I/O Port(s)	Please refer to the User's Manual	
Hardware Version	N/A	
Software Version	N/A	

Note:

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

2.

Channel List for 802.11b/g/n(20 MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	04	2427	07	2442	10	2457
02	2417	05	2432	08	2447	11	2462
03	2422	06	2437	09	2452		

Channel List for 802.11n(40MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
03	2422	06	2437	09	2452		
04	2427	07	2442				
05	2432	08	2447				

3.

Table for Filed Antenna

Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
A	N/A	N/A	Omnidirectional antenna	SMA connector	3.0	Wifi 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	802.11b CH1/ CH6/ CH11
Mode 2	802.11g CH1/ CH6/ CH11
Mode 3	802.11n/20MHz CH1/ CH6/ CH11
Mode 4	802.11n/40MHz CH3/ CH6/ CH9
Mode 5	Link Mode

For Conducted Emission	
Final Test Mode	Description
Mode 5	Link Mode

For RF conducted measurement	
Final Test Mode	Description
Mode 1	802.11b CH1/ CH6/ CH11
Mode 2	802.11g CH1/ CH6/ CH11
Mode 3	802.11n/20MHz CH1/ CH6/ CH11
Mode 4	802.11n/40MHz CH3/ CH6/ CH9

For Radiated Emission	
Final Test Mode	Description
Mode 1	802.11b CH1/ CH6/ CH11
Mode 2	802.11g CH1/ CH6/ CH11
Mode 3	802.11n/20MHz CH1/ CH6/ CH11
Mode 4	802.11n/40MHz CH3/ CH6/ CH9

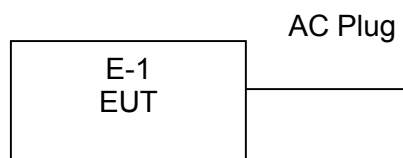
Note:

- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported
- (3) EUT configured to transmit continuously,

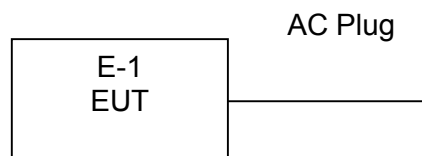
Operated Mode for Worst Duty Cycle	
Test Signal Duty Cycle (x)	Average correction factor (dB)
100% - IEEE 802.11b	0
100% - IEEE 802.11g	0
100% - IEEE 802.11n (HT20)	0
100% - IEEE 802.11n (HT40)	0

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conducted Emission Test



Radiated Spurious Emission Test



RF conducted measurement



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	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

1	Attenuation	MCE	24-10-34	BN9258	2015.06.08	2016.06.07	1 year
---	-------------	-----	----------	--------	------------	------------	--------

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

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

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	73.00	60.00	56.00	46.00	CISPR
5.0 -30.0	73.00	60.00	60.00	50.00	CISPR

0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	73.00	60.00	56.00	46.00	FCC
5.0 -30.0	73.00	60.00	60.00	50.00	FCC

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

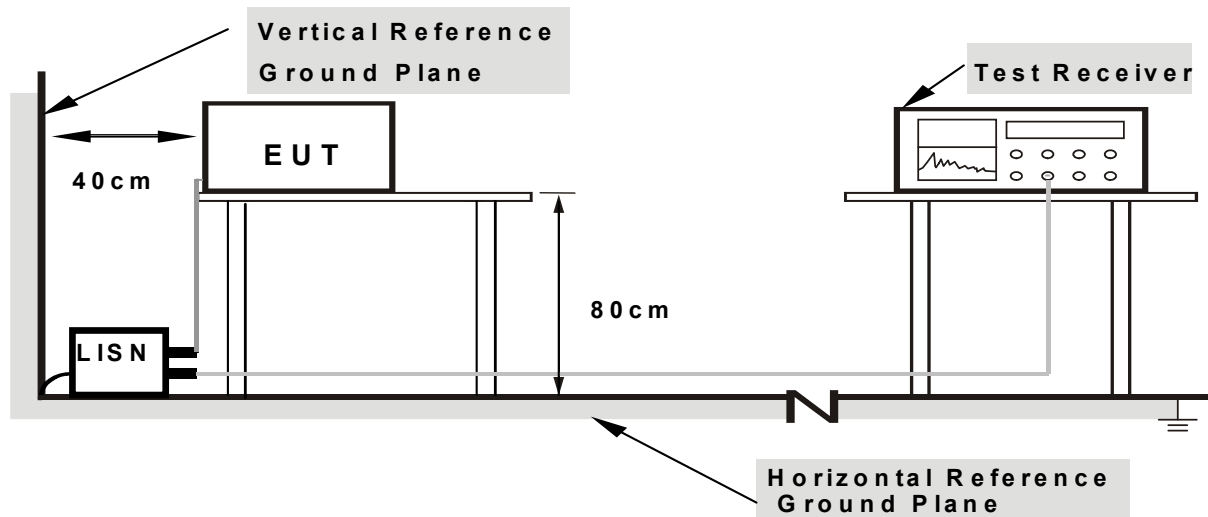
3.1.2 TEST PROCEDURE

- The EUT was placed 0.8 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.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 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 cm from other units and other metal planes

3.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.1.6 TEST RESULTS

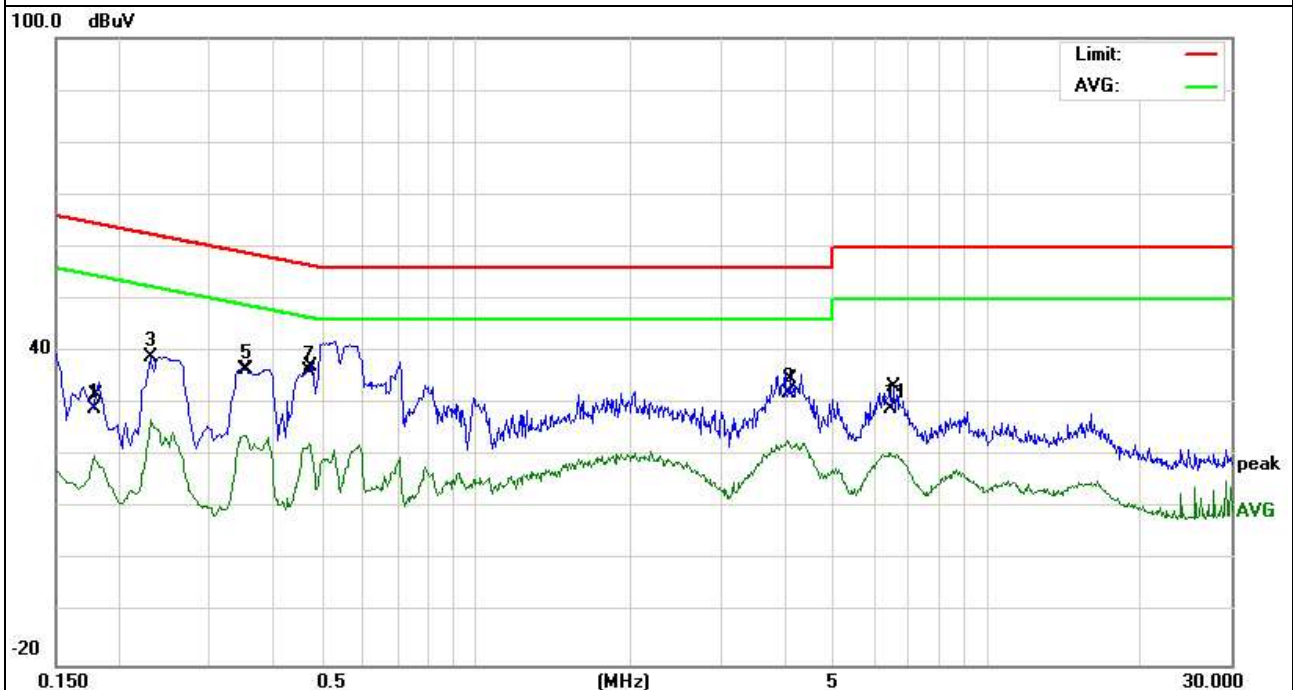
EUT :	UCOWS Cow Activity Reader	Model Name. :	ATS-UCOWS002
Temperature :	26 °C	Relative Humidity :	56%
Pressure :	1010hPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode :	Mode 5

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1780	18.12	11.02	29.14	64.58	-35.44	peak
0.1780	9.07	11.02	20.09	54.58	-34.49	AVG
0.2300	28.34	10.76	39.10	62.45	-23.35	peak
0.2300	16.05	10.76	26.81	52.45	-25.64	AVG
0.3540	25.63	10.82	36.45	58.87	-22.42	peak
0.3540	13.16	10.82	23.98	48.87	-24.89	AVG
0.4700	25.70	10.62	36.32	56.51	-20.19	peak
0.4700	11.87	10.62	22.49	46.51	-24.02	AVG
4.0580	21.53	10.60	32.13	56.00	-23.87	peak
4.0580	12.45	10.60	23.05	46.00	-22.95	AVG
6.4620	18.34	10.71	29.05	60.00	-30.95	peak
6.4620	10.09	10.71	20.80	50.00	-29.20	AVG

Remark:

1. All readings are Quasi-Peak and Average values.

2. Factor = Insertion Loss + Cable Loss.

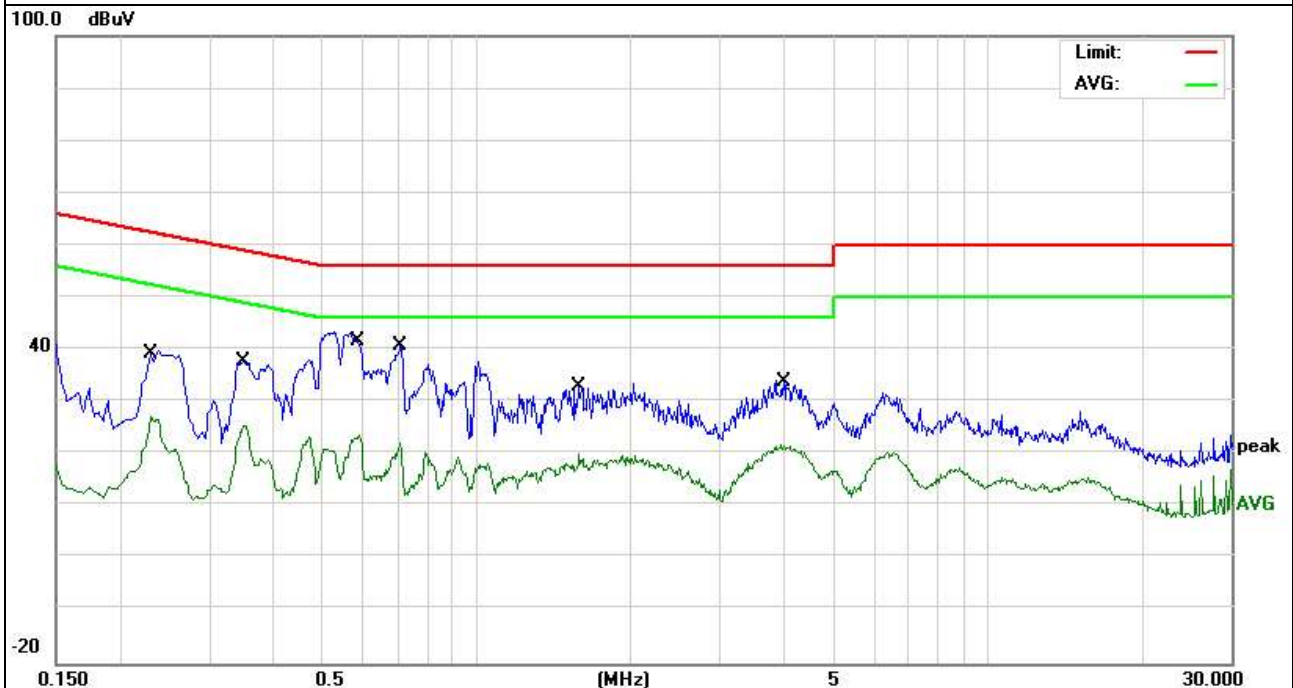


EUT :	UCOWS Cow Activity Reader	Model Name. :	ATS-UCOWS002
Temperature :	26 °C	Relative Humidity :	56%
Pressure :	1010hPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode :	Mode 5

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.2300	28.60	10.76	39.36	62.45	-23.09	QP
0.2300	16.61	10.76	27.37	52.45	-25.08	AVG
0.3500	26.96	10.82	37.78	58.96	-21.18	QP
0.3500	14.51	10.82	25.33	48.96	-23.63	AVG
0.5899	30.51	10.55	41.06	56.00	-14.94	QP
0.5899	13.01	10.55	23.56	46.00	-22.44	AVG
0.7100	30.24	10.53	40.77	56.00	-15.23	QP
0.7100	11.51	10.53	22.04	46.00	-23.96	AVG
1.5900	22.57	10.52	33.09	56.00	-22.91	QP
1.5900	9.48	10.52	20.00	46.00	-26.00	AVG
3.9620	21.76	10.60	32.36	56.00	-23.64	QP
3.9620	11.19	10.60	21.79	46.00	-24.21	AVG

Remark:

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



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

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

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5 th harmonic of the highest frequency or 40 GHz, whichever is lower

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

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

3.2.2 TEST PROCEDURE

- The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz and above 1GHz.
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter Anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the equipment or of the substitution antenna shall be 0.8 m for below 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.
For the radiated emission test above 1GHz:
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- The initial step in collecting radiated 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.
- 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.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

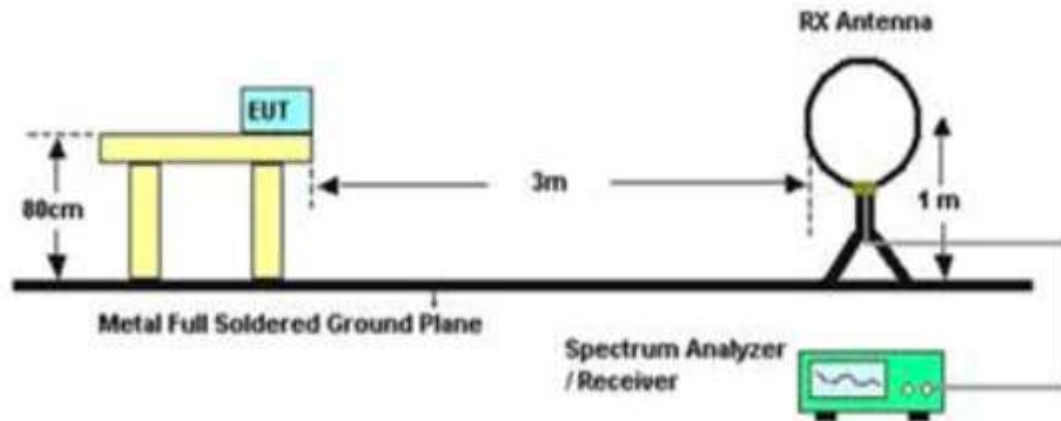
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

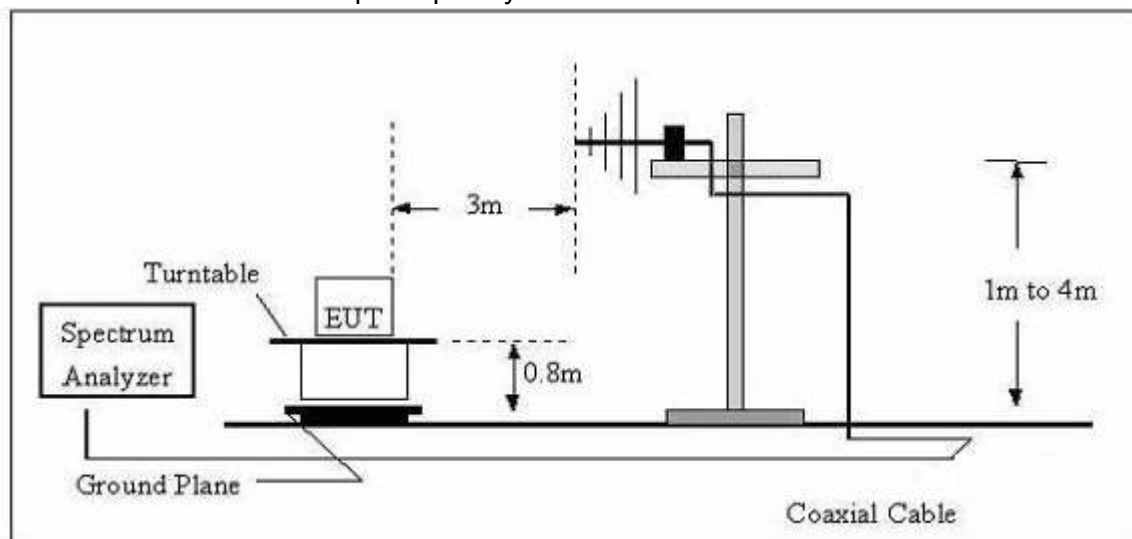
No deviation

3.2.4 TEST SETUP

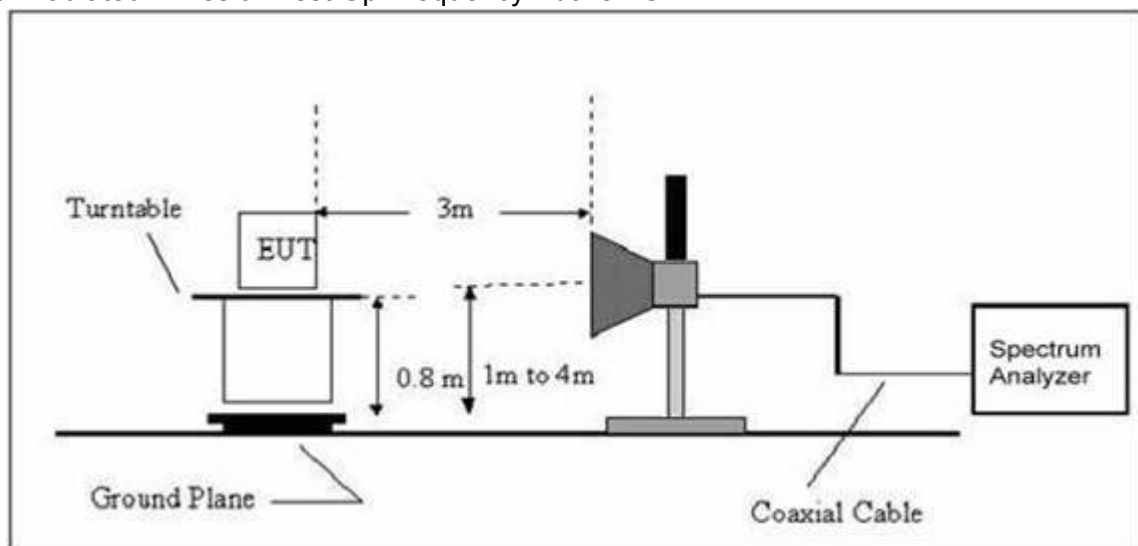
(A) Radiated Emission Test-Up Frequency Below 30MHz



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



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



3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)

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

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

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

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

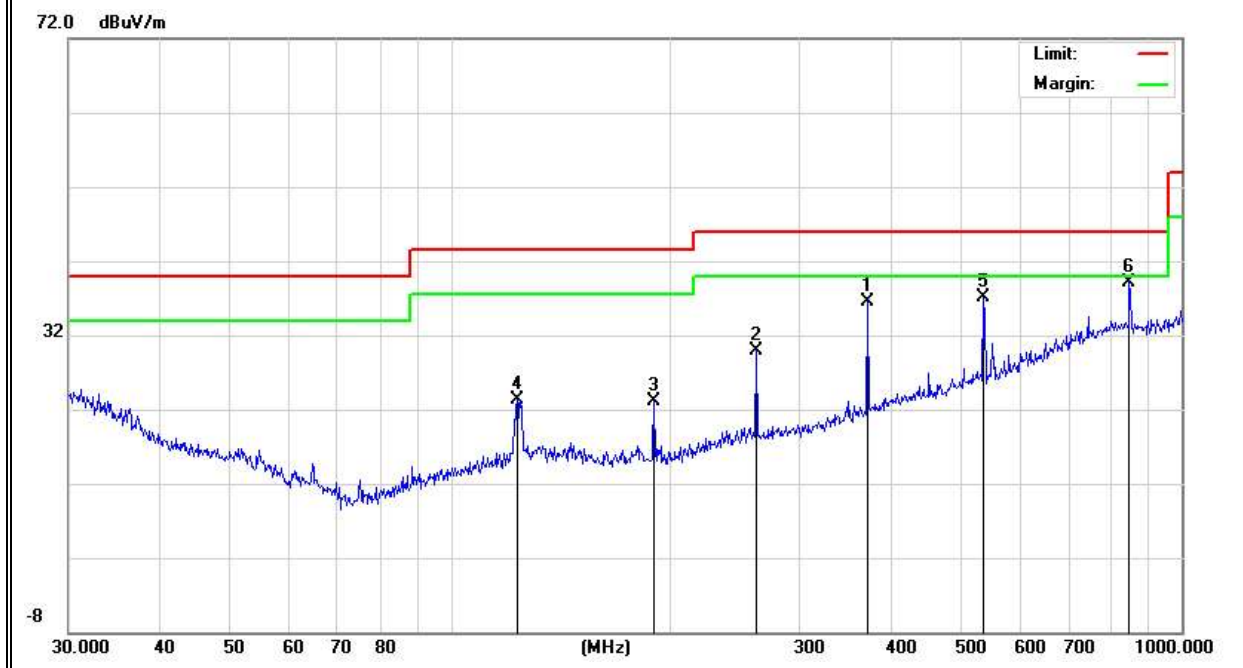
3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)

EUT :	UCOWS Cow Activity Reader	Model Name :	ATS-UCOWS002
Temperature :	20 °C	Relative Humidity :	48%
Pressure:	1010 hPa	Test Voltage :	AC 120V
Test Mode :	TX(802.11b ch 1)		

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
V	372.0045	19.34	17.16	36.50	46.00	-9.50	QP
V	261.9753	16.27	13.73	30.00	46.00	-16.00	QP
V	189.7384	12.40	10.70	23.10	43.50	-20.40	QP
V	123.2655	11.27	12.03	23.30	43.50	-20.20	QP
V	535.7073	16.06	21.04	37.10	46.00	-8.90	QP
V	848.0562	11.96	27.24	39.20	46.00	-6.80	QP

Remark:

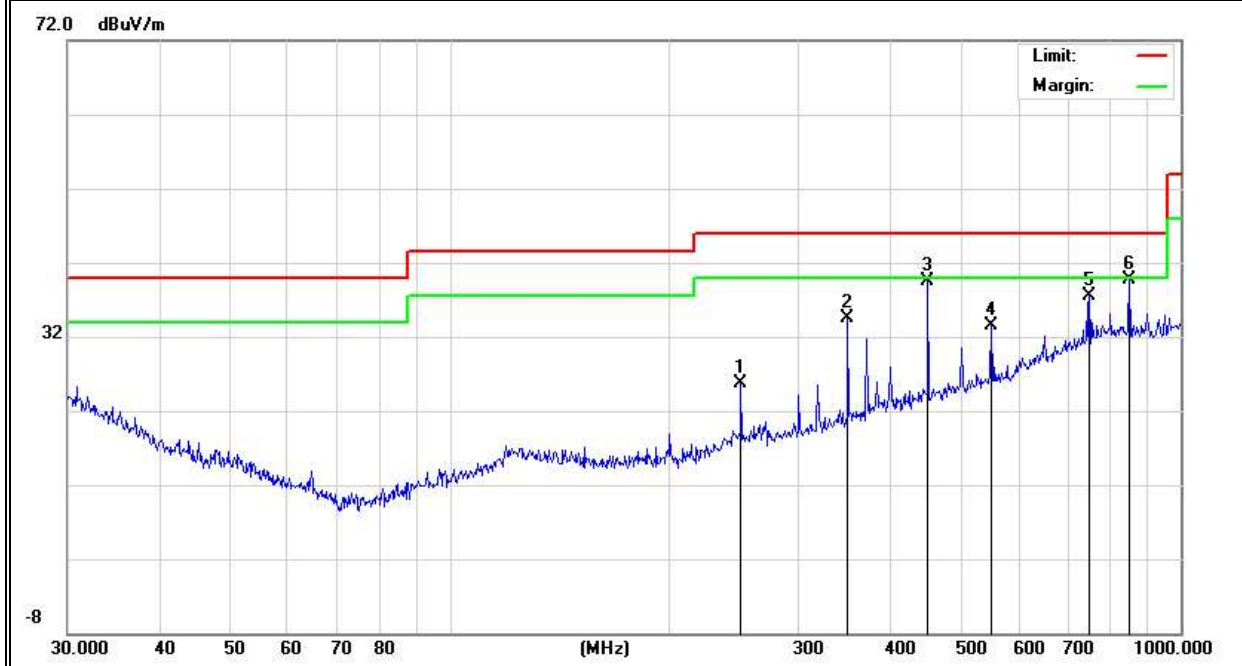
Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit



Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
H	250.3012	12.14	13.59	25.73	46.00	-20.27	QP
H	350.4768	18.29	16.26	34.55	46.00	-11.45	QP
H	451.1350	20.19	19.33	39.52	46.00	-6.48	QP
H	550.9480	12.15	21.36	33.51	46.00	-12.49	QP
H	750.1083	11.50	26.10	37.60	46.00	-8.40	QP
H	851.0353	12.48	27.22	39.70	46.00	-6.30	QP

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit



3.2.8 TEST RESULTS (ABOVE 1000 MHZ)

EUT :	UCOWS Cow Activity Reader	Model Name :	ATS-UCOWS002
Temperature :	20 °C	Relative Humidity :	48%
Pressure:	1010 hPa	Test Voltage :	AC 120V
Test Mode :	TX(802.11b)		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark	Comment
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
Low Channel (2412 MHz)-Above 1G							
4824	45.64	10.44	56.08	74	-17.92	Pk	Vertical
4824	28.39	10.44	38.83	54	-15.17	AV	Vertical
7236	37.53	12.39	49.92	74	-24.08	pk	Vertical
4824	44.26	10.44	54.7	74	-19.3	pk	Horizontal
4824	27.49	10.44	37.93	54	-16.07	AV	Horizontal
7236	35.52	12.39	47.91	74	-26.09	pk	Horizontal
Mid Channel (2437 MHz)-Above 1G							
4874	46.78	10.4	57.18	74	-16.82	pk	Vertical
4874	32.15	10.4	42.55	54	-11.45	AV	Vertical
7311	34.76	12.75	47.51	74	-26.49	Pk	Vertical
4874	75.45	10.4	85.85	74	11.85	Pk	Horizontal
4874	29.15	10.4	39.55	54	-14.45	AV	Horizontal
7311	31.76	12.75	44.51	74	-29.49	Pk	Horizontal
High Channel (2462 MHz)- Above 1G							
4924	46.14	10.39	56.53	74	-17.47	pk	Vertical
4924	33.45	10.39	43.84	54	-10.16	AV	Vertical
7386	34.22	12.68	46.9	74	-27.1	pk	Vertical
4924	46.25	10.39	56.64	74	-17.36	pk	Horizontal
4924	29.42	10.39	39.81	54	-14.19	AV	Horizontal
7386	31.14	12.68	43.82	74	-30.18	pk	Horizontal

Note1: 802.11b mode is worse case.

Note2: Investigated frequency range is up to 10th harmonics of highest operating frequency, reports only record the worst record

4. POWER SPECTRAL DENSITY TEST

4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

4.1.1 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. 3 kHz ≤ Set the RBW ≤ 100 kHz.
4. Set the VBW ≥ 3 x RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



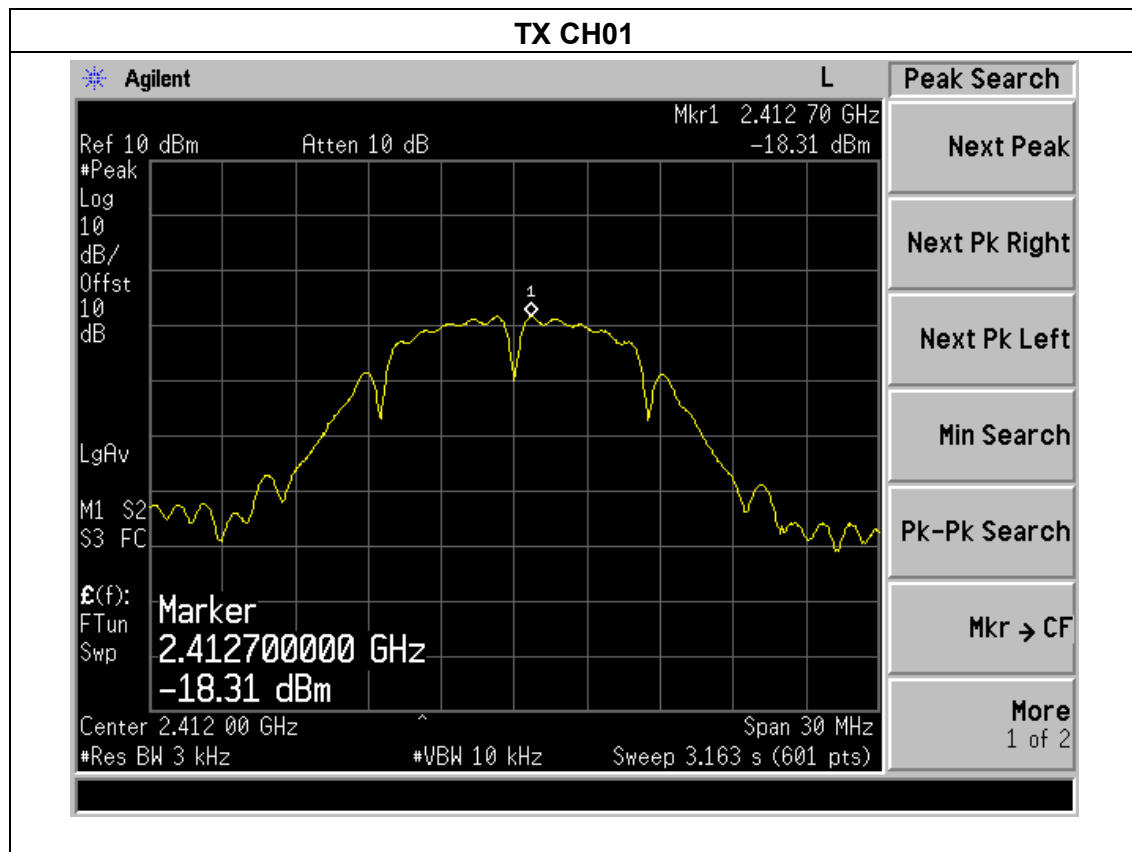
4.1.4 EUT OPERATION CONDITIONS

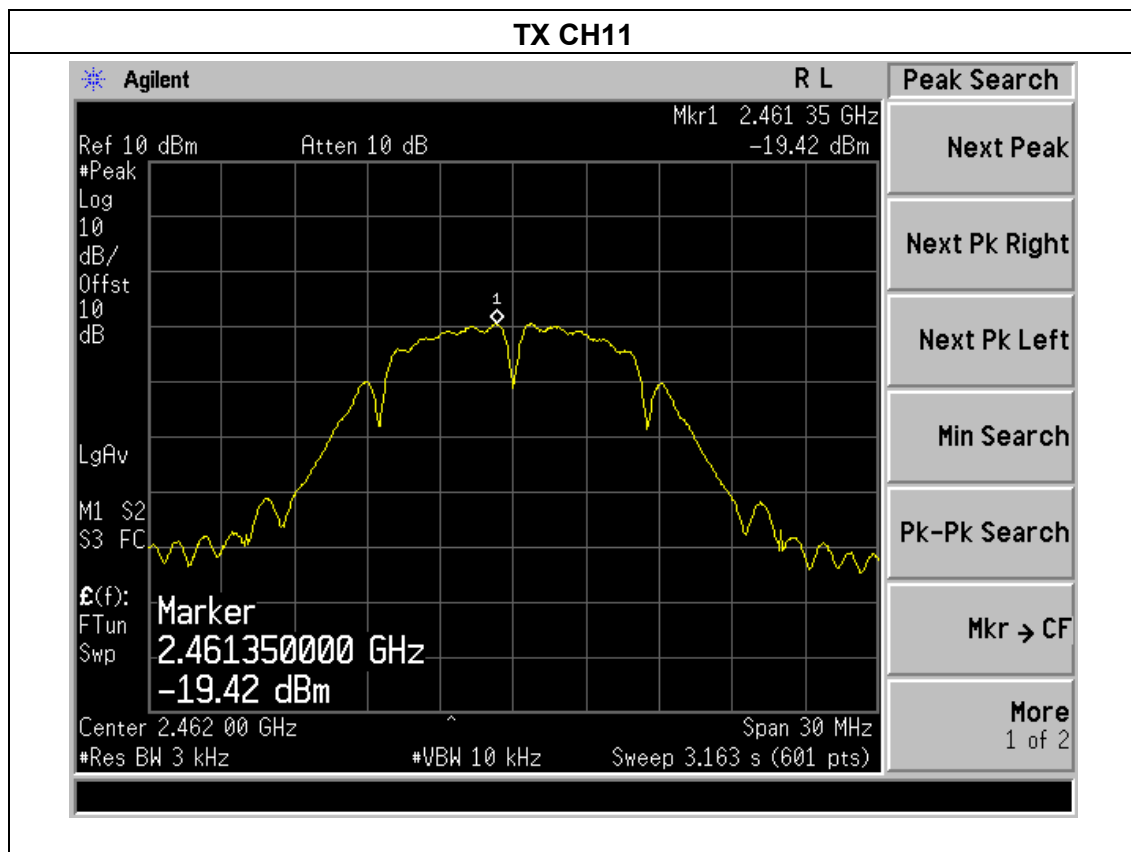
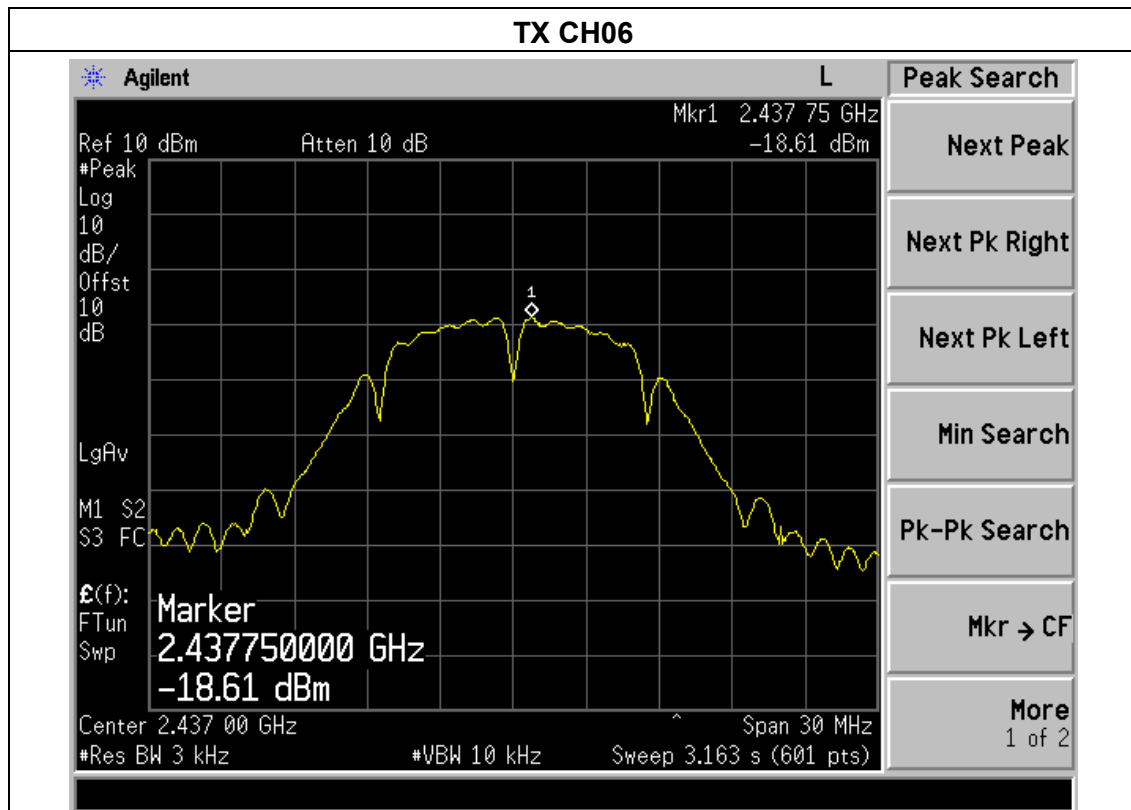
The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

4.1.5 TEST RESULTS

EUT :	UCOWS Cow Activity Reader	Model Name :	ATS-UCOWS002
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1015 hPa	Test Voltage :	AC 120V
Test Mode :	TX b Mode /CH01, CH06, CH11		

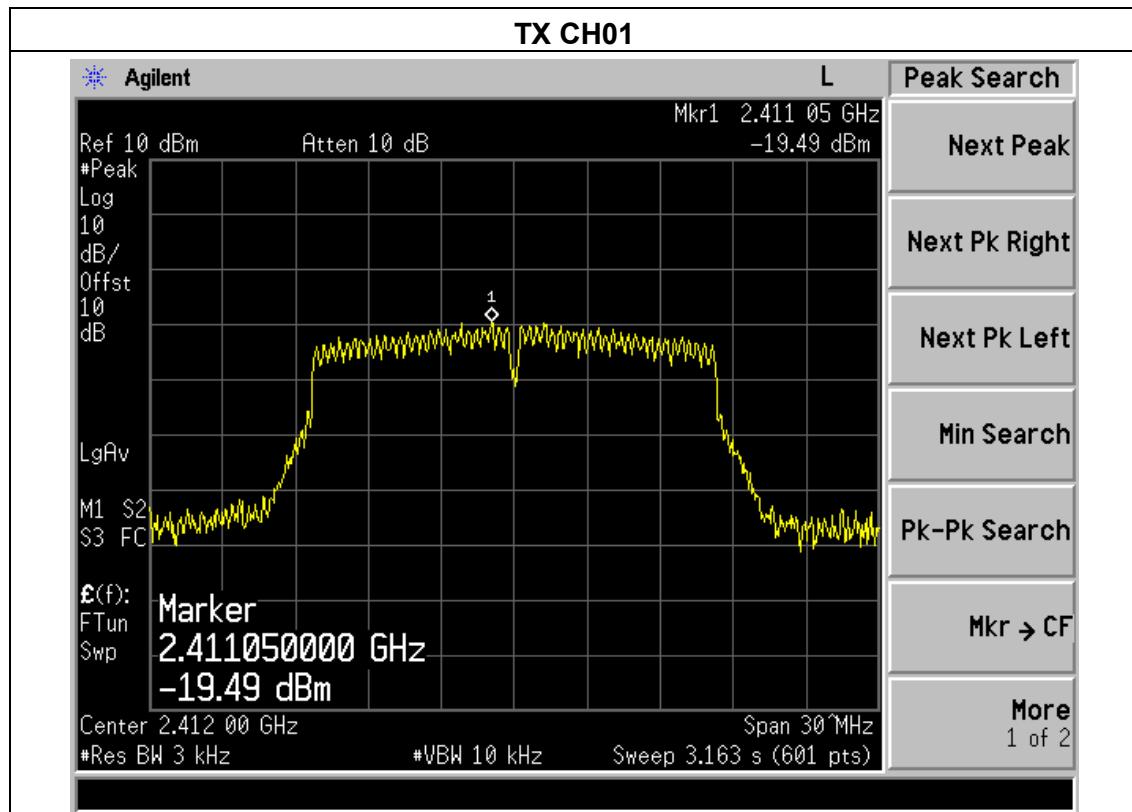
Frequency	Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412 MHz	-18.31	8	PASS
2437 MHz	-18.61	8	PASS
2462 MHz	-19.42	8	PASS

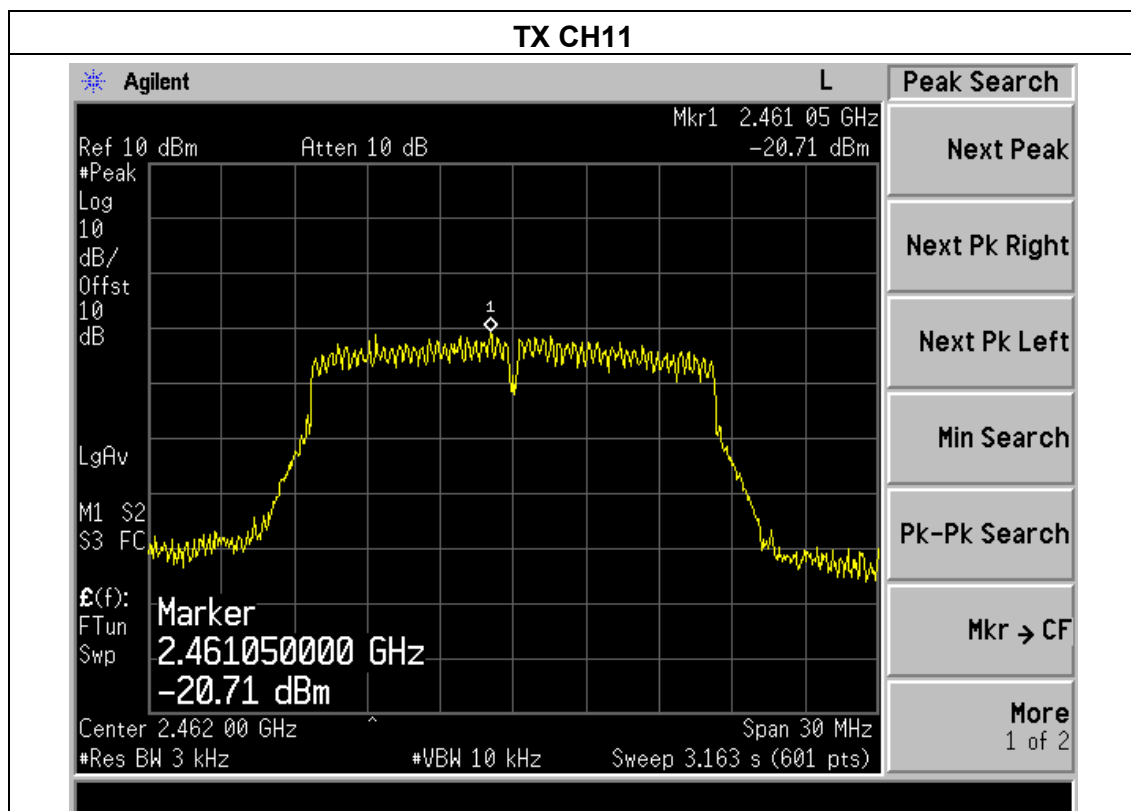
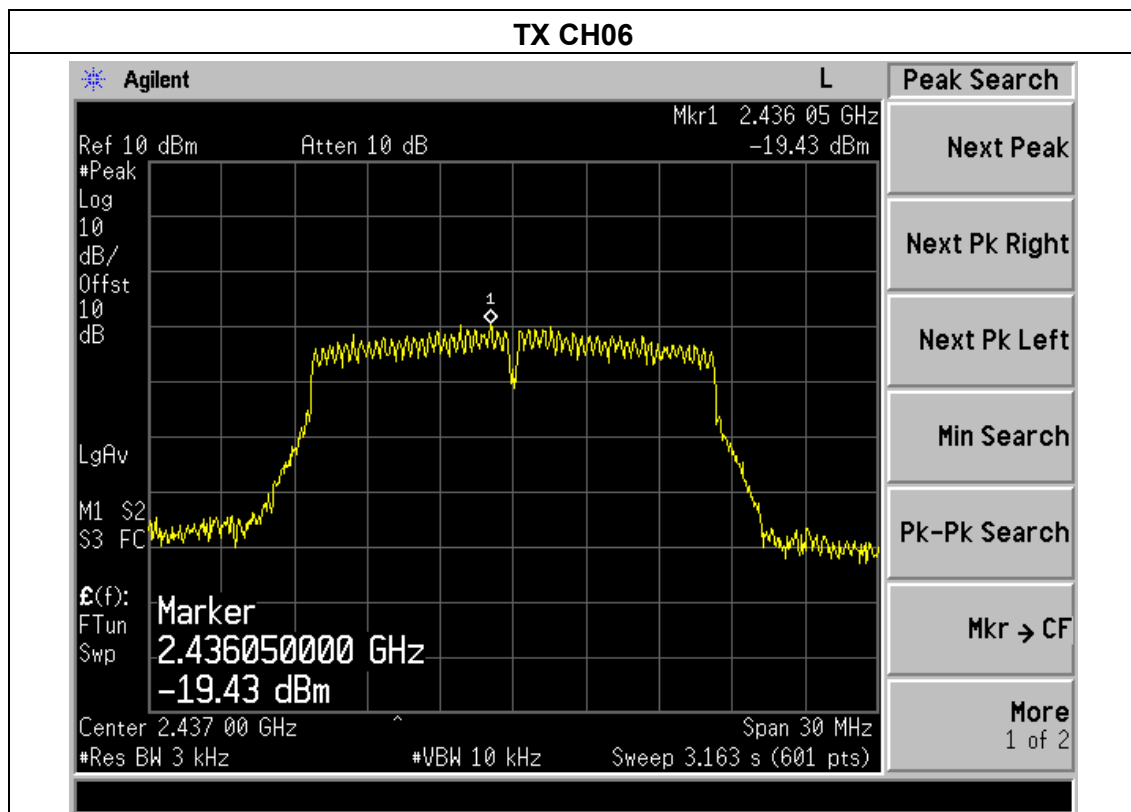




EUT :	UCOWS Cow Activity Reader	Model Name :	ATS-UCOWS002
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1015 hPa	Test Voltage :	AC 120V
Test Mode :	TX g Mode /CH01, CH06, CH11		

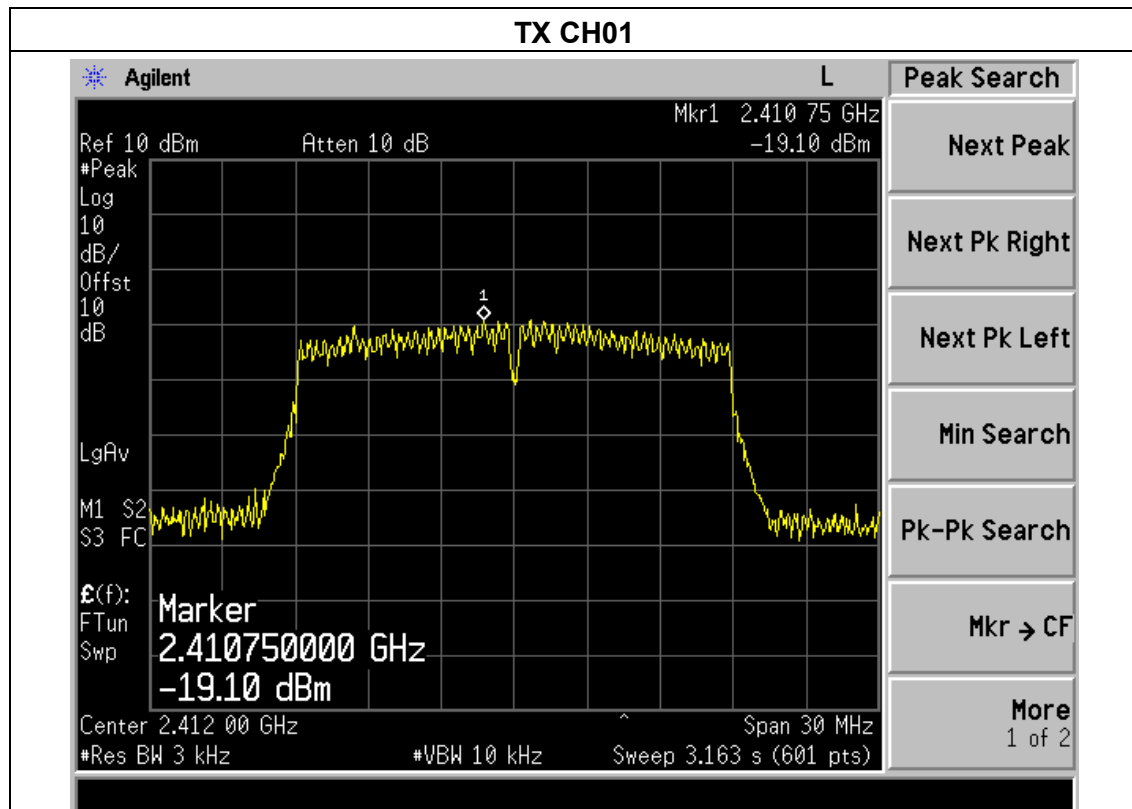
Frequency	Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412 MHz	-19.49	8	PASS
2437 MHz	-19.43	8	PASS
2462 MHz	-20.71	8	PASS



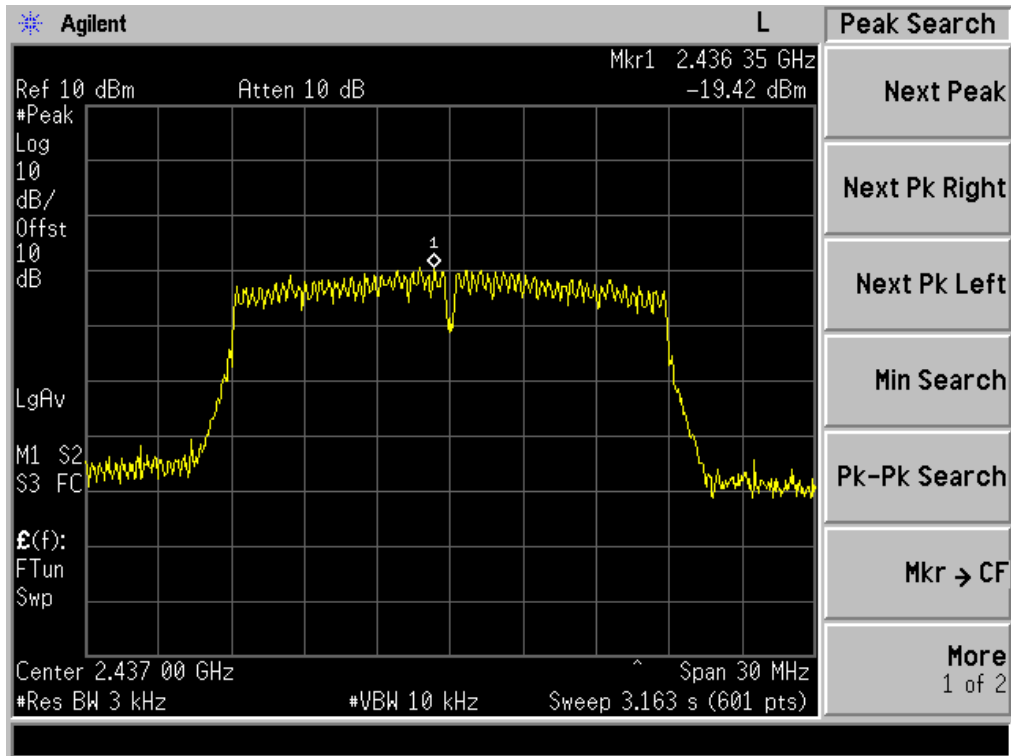


EUT :	UCOWS Cow Activity Reader	Model Name :	ATS-UCOWS002
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1015 hPa	Test Voltage :	AC 120V
Test Mode :	TX n Mode(20M) /CH01, CH06, CH11		

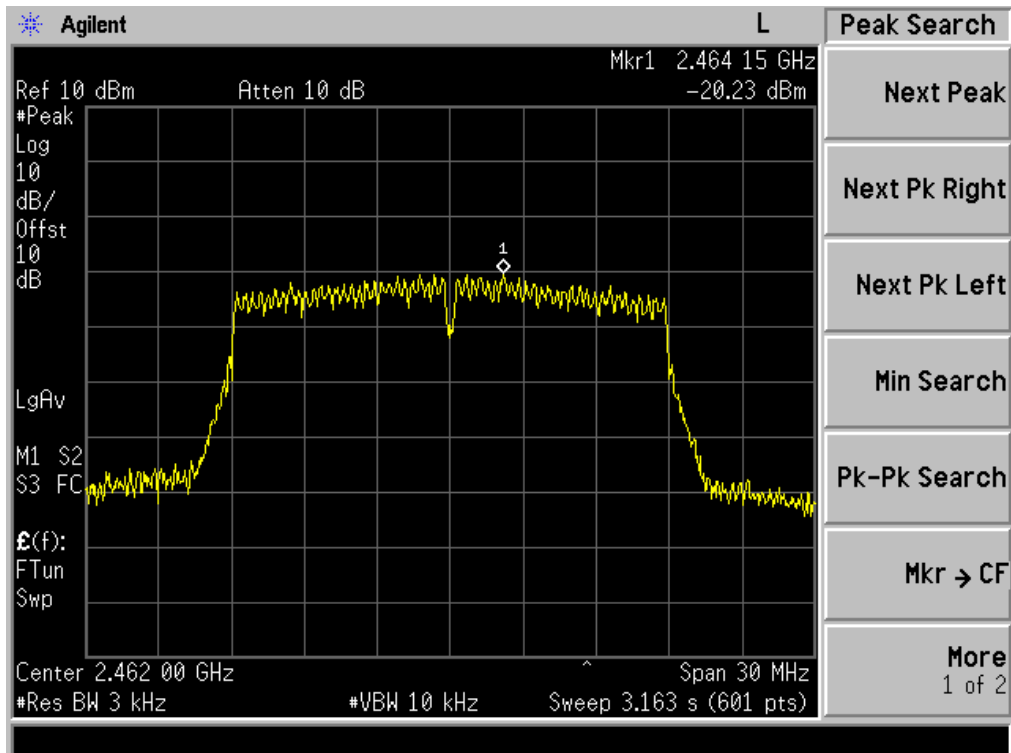
Frequency	Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412 MHz	-19.10	8	PASS
2437 MHz	-19.42	8	PASS
2462 MHz	-20.23	8	PASS



TX CH06

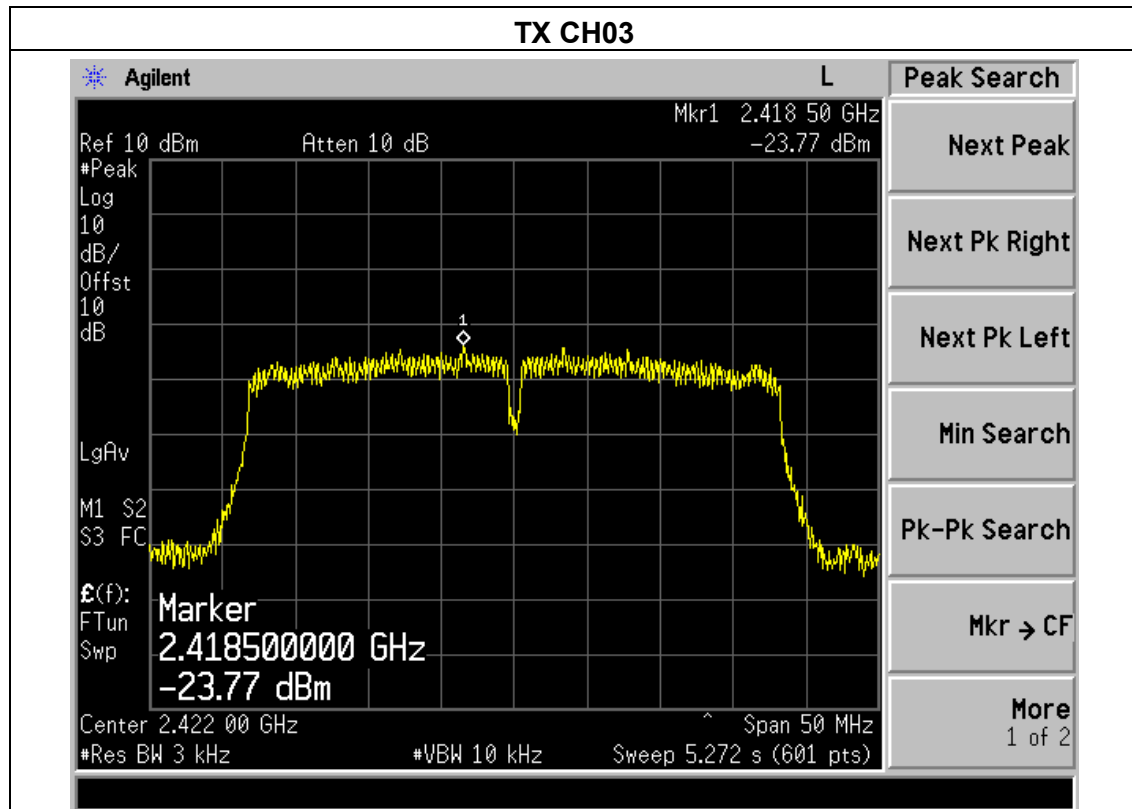


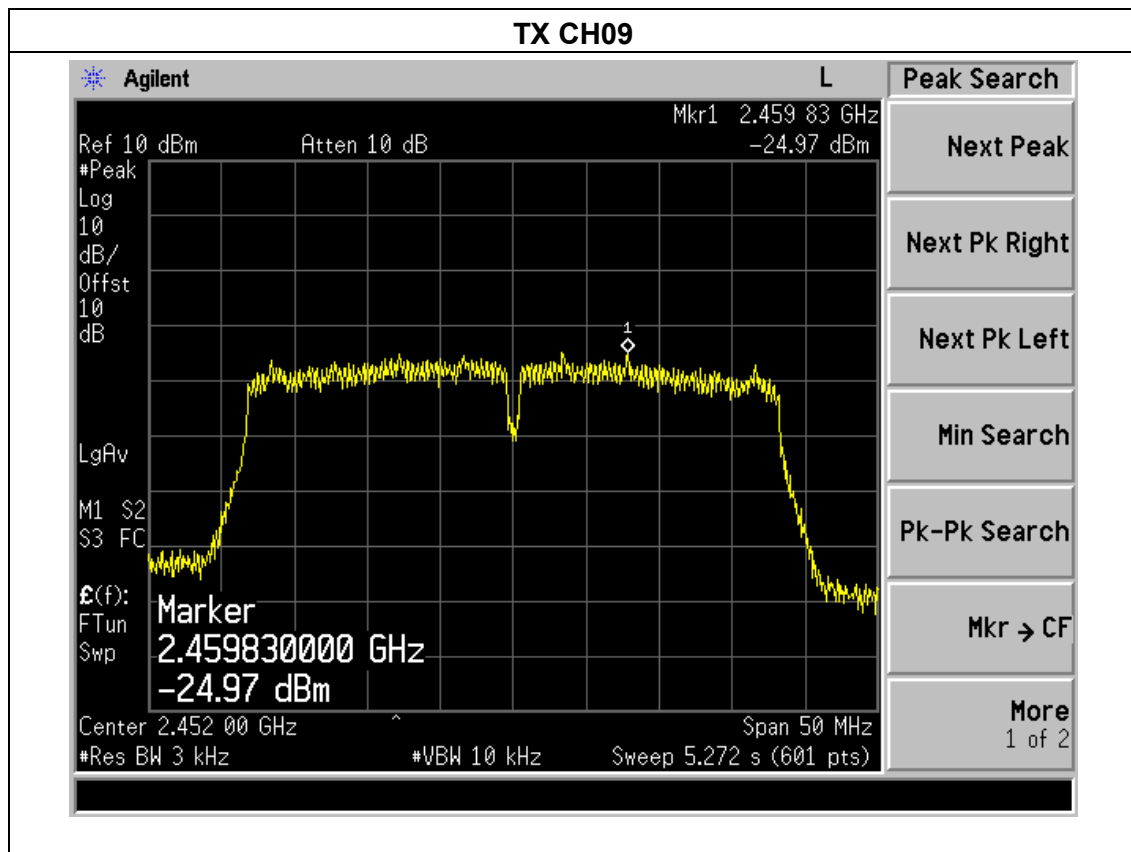
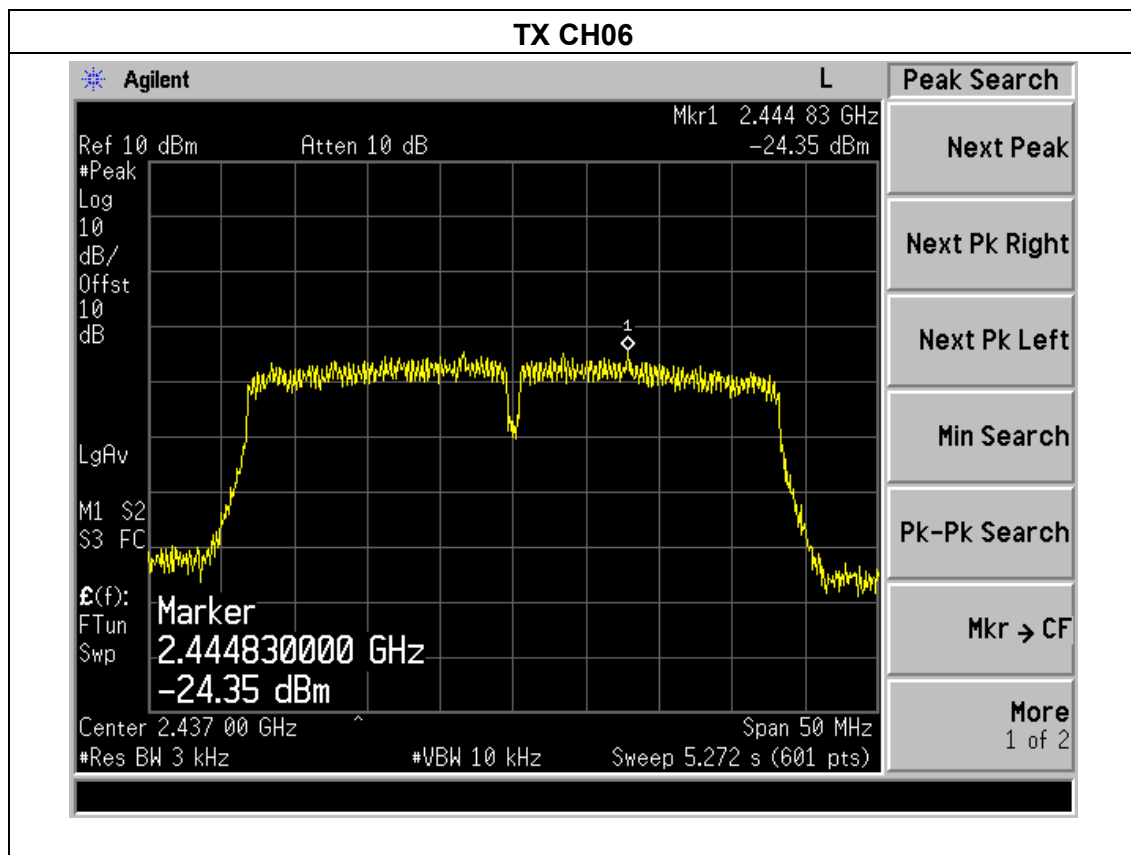
TX CH11



EUT :	UCOWS Cow Activity Reader	Model Name :	ATS-UCOWS002
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1015 hPa	Test Voltage :	AC 120V
Test Mode :	TX n Mode(40M) /CH03, CH06, CH09		

Frequency	Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
2422 MHz	-23.77	8	PASS
2437 MHz	-24.35	8	PASS
2452 MHz	-24.97	8	PASS





5. BANDWIDTH TEST

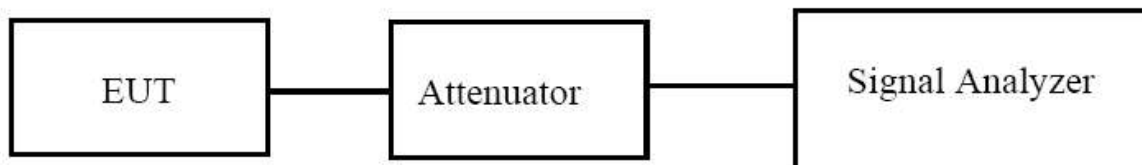
5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	$\geq 500\text{KHz}$ (6dB bandwidth)	2400-2483.5	PASS

5.1.1 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

TEST SETUP



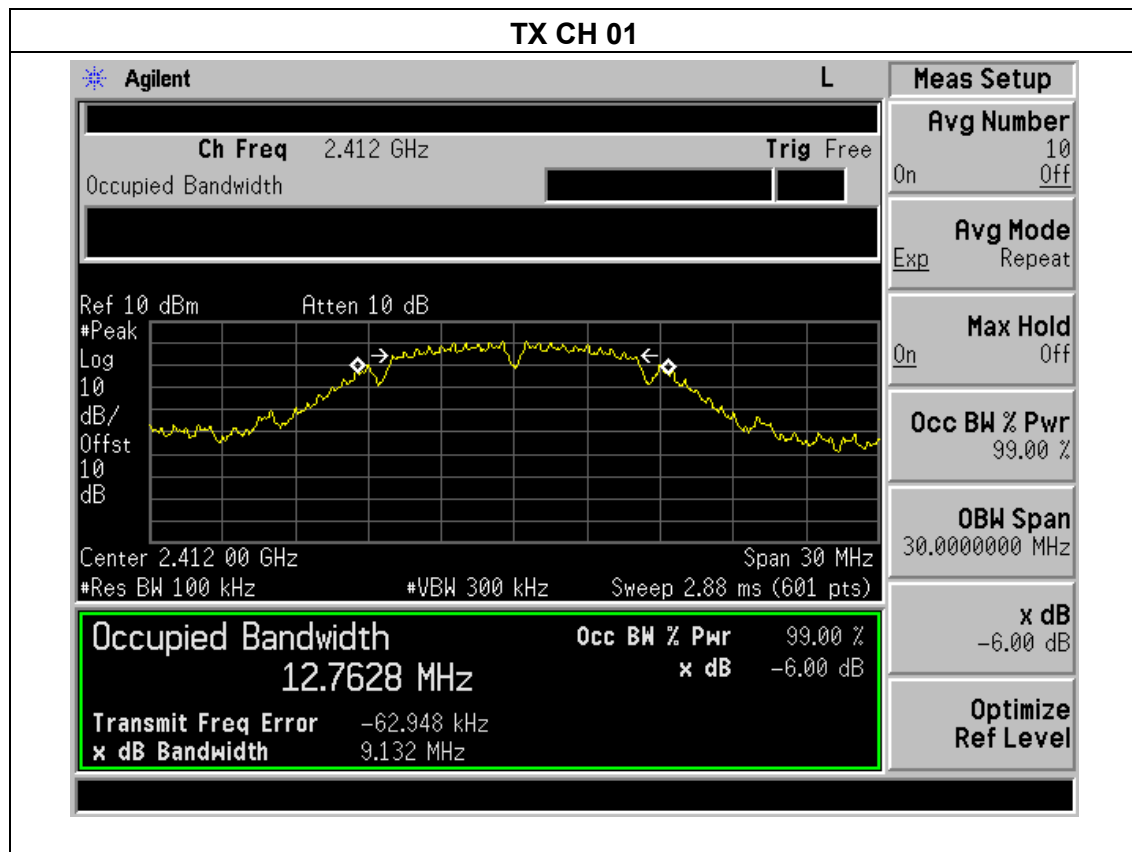
5.1.2 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

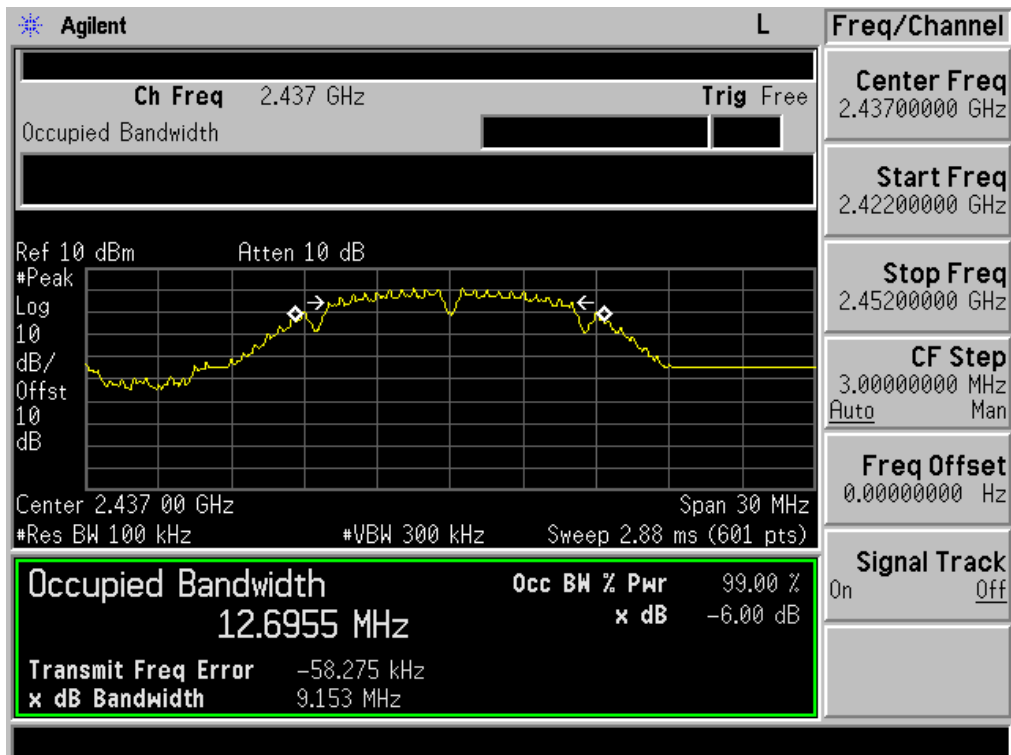
5.1.3 TEST RESULTS

EUT :	UCOWS Cow Activity Reader	Model Name :	ATS-UCOWS002
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	AC 120V
Test Mode :	TX b Mode /CH01, CH06, CH11		

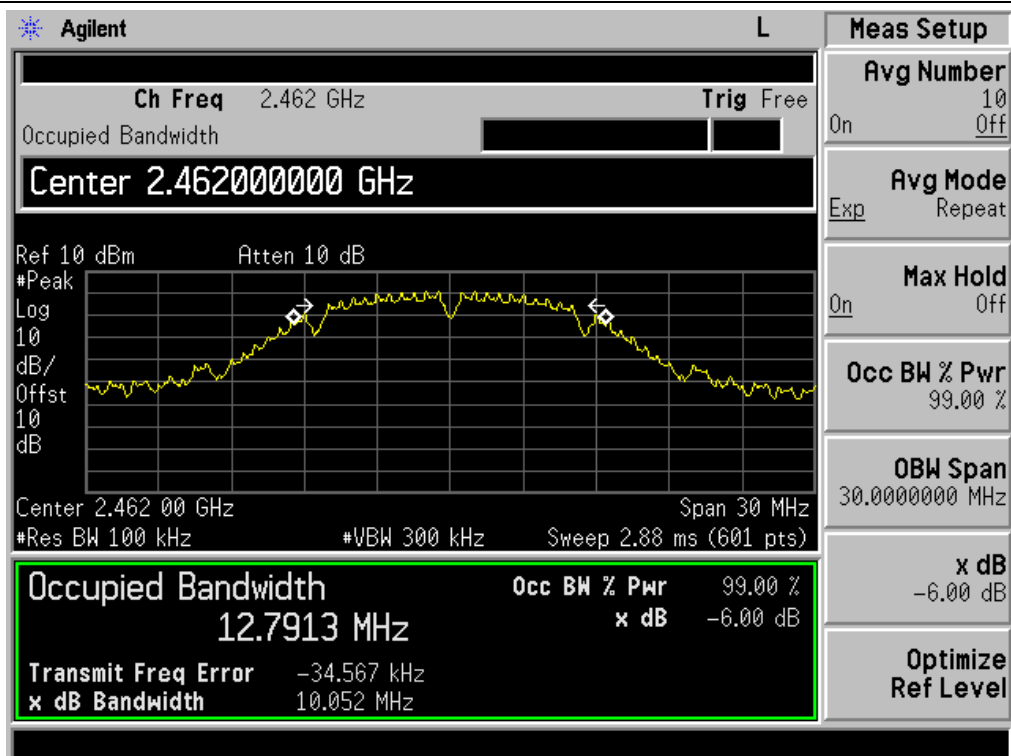
Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	9.132	500	Pass
Middle	2437	9.153	500	Pass
High	2462	10.052	500	Pass



TX CH 06

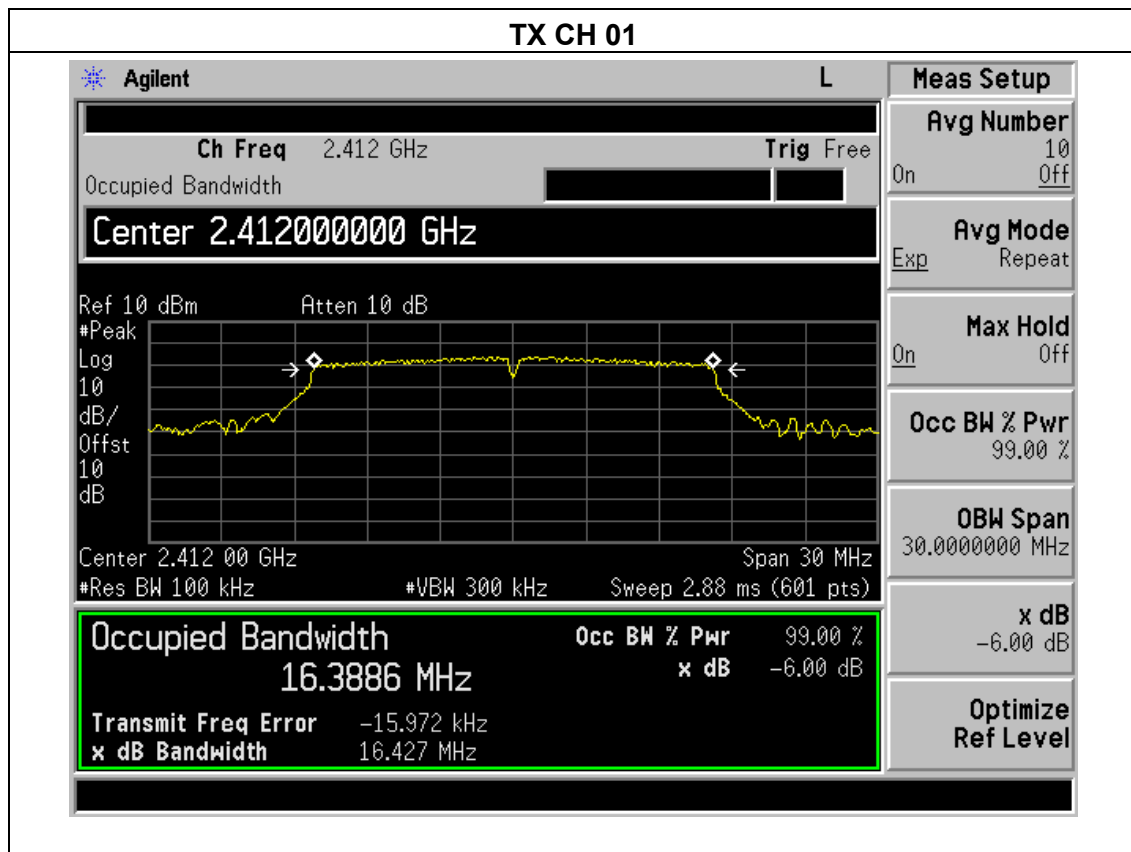


TX CH 11

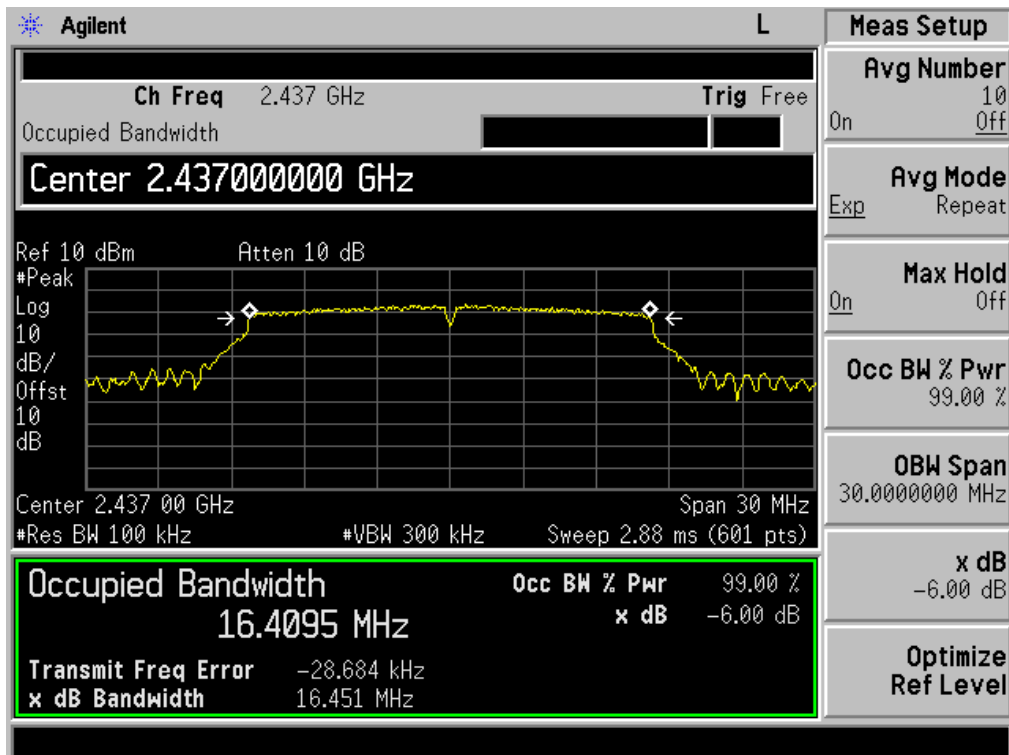


EUT :	UCOWS Cow Activity Reader	Model Name :	ATS-UCOWS002
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC 120V
Test Mode :	TX g Mode /CH01, CH06, CH11		

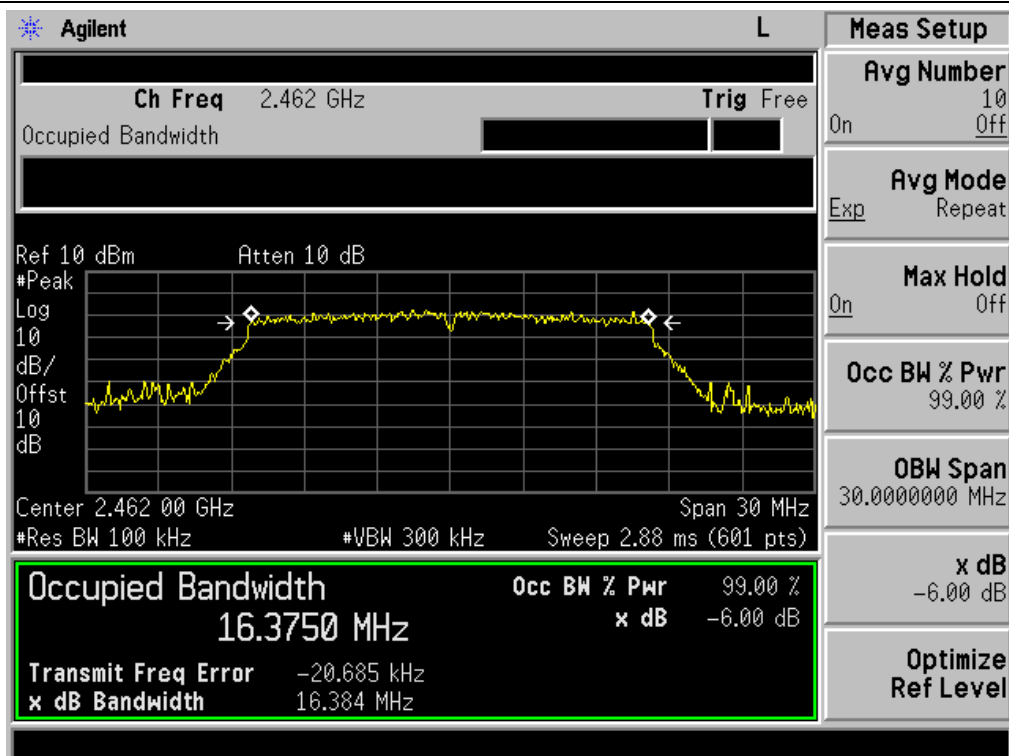
Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	16.427	500	Pass
Middle	2437	16.451	500	Pass
High	2462	16.384	500	Pass



TX CH 06

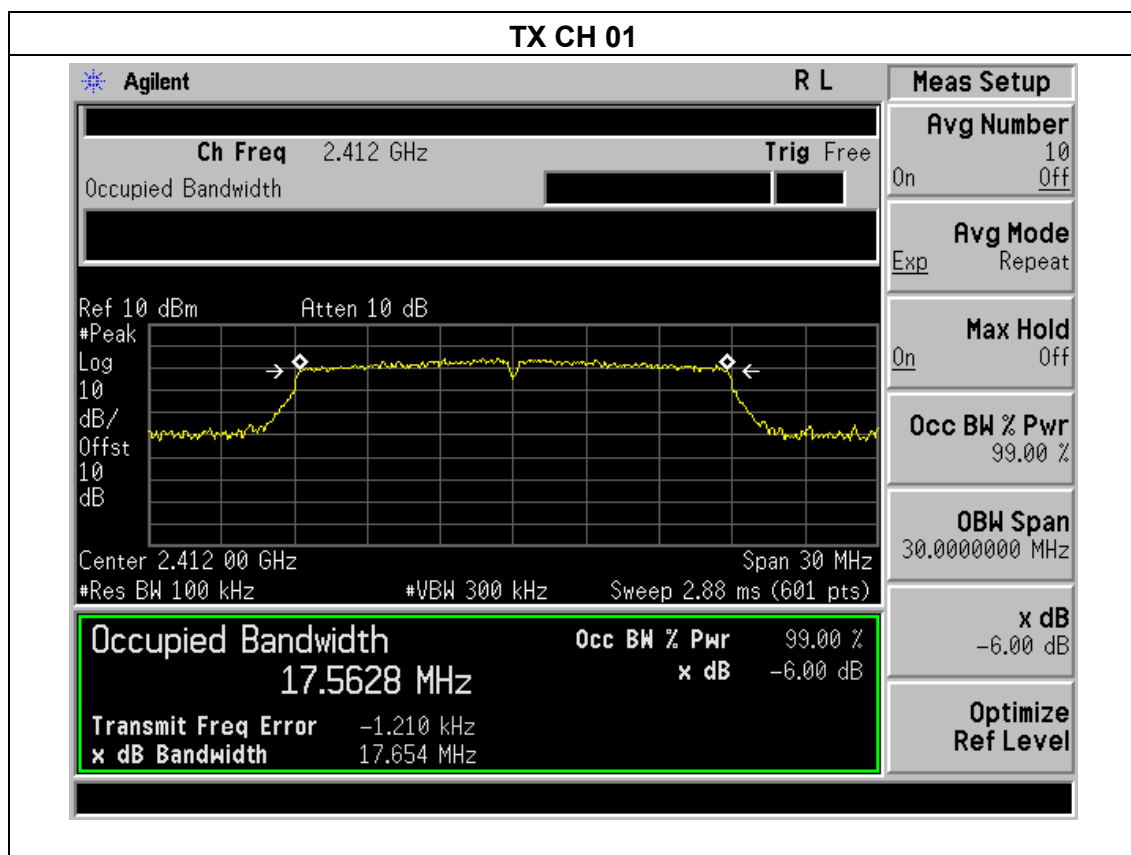


TX CH 11

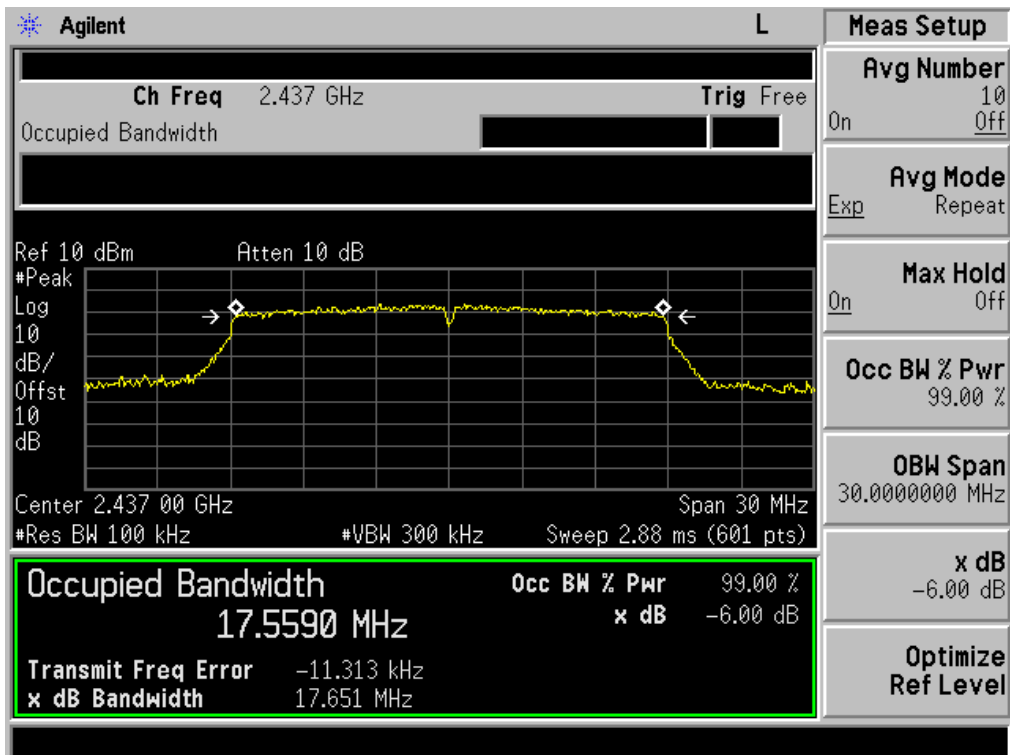


EUT :	UCOWS Cow Activity Reader	Model Name :	ATS-UCOWS002
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	AC 120V
Test Mode :	TX n Mode(20M) /CH01, CH06, CH11		

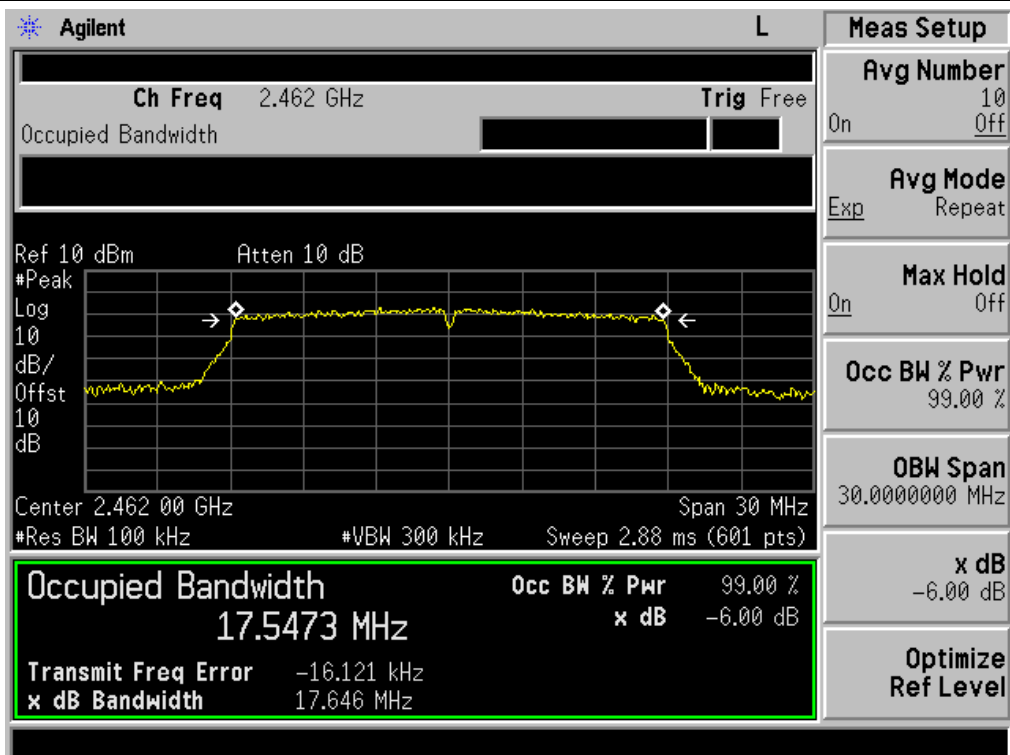
Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	17.654	500	Pass
Middle	2437	17.651	500	Pass
High	2462	17.646	500	Pass



TX CH 06

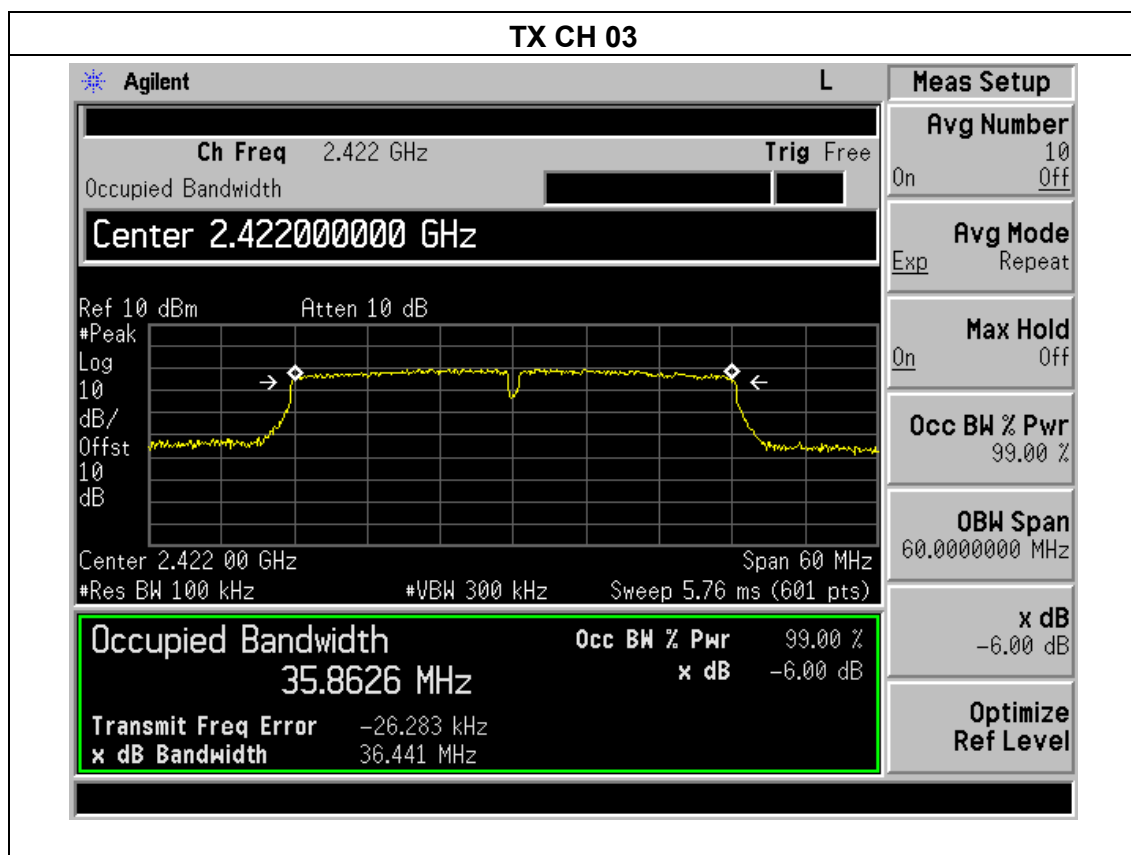


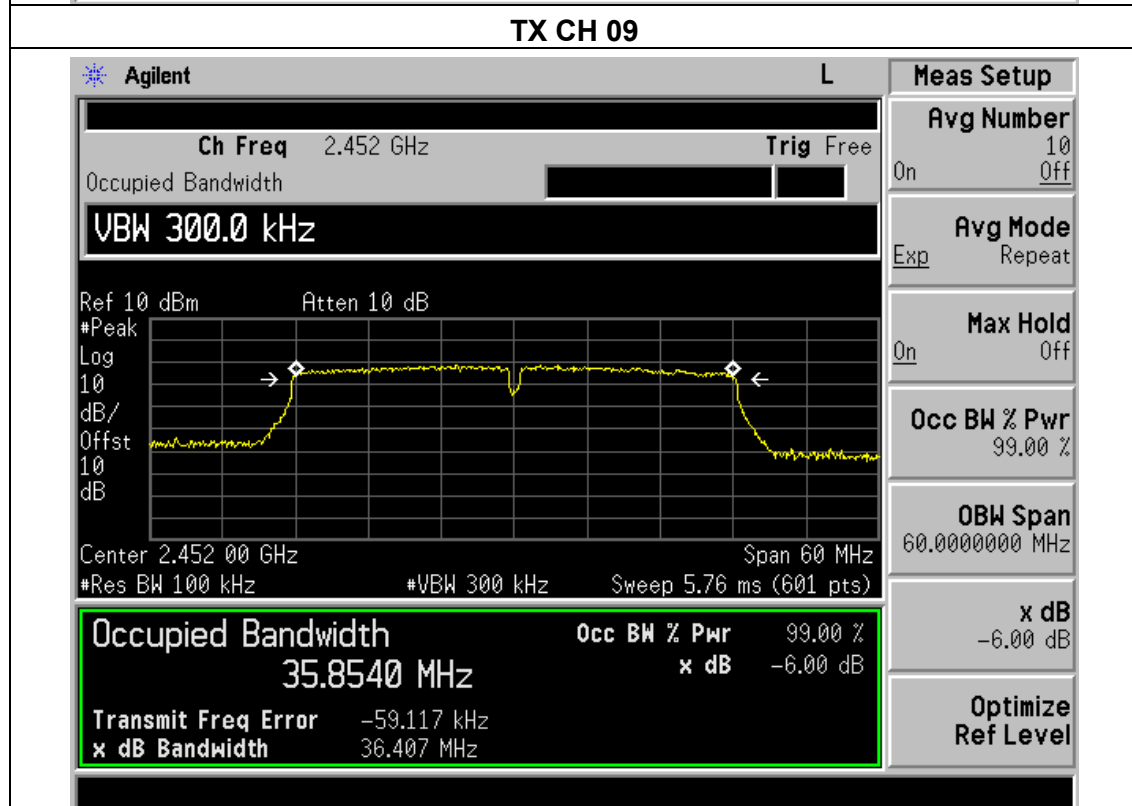
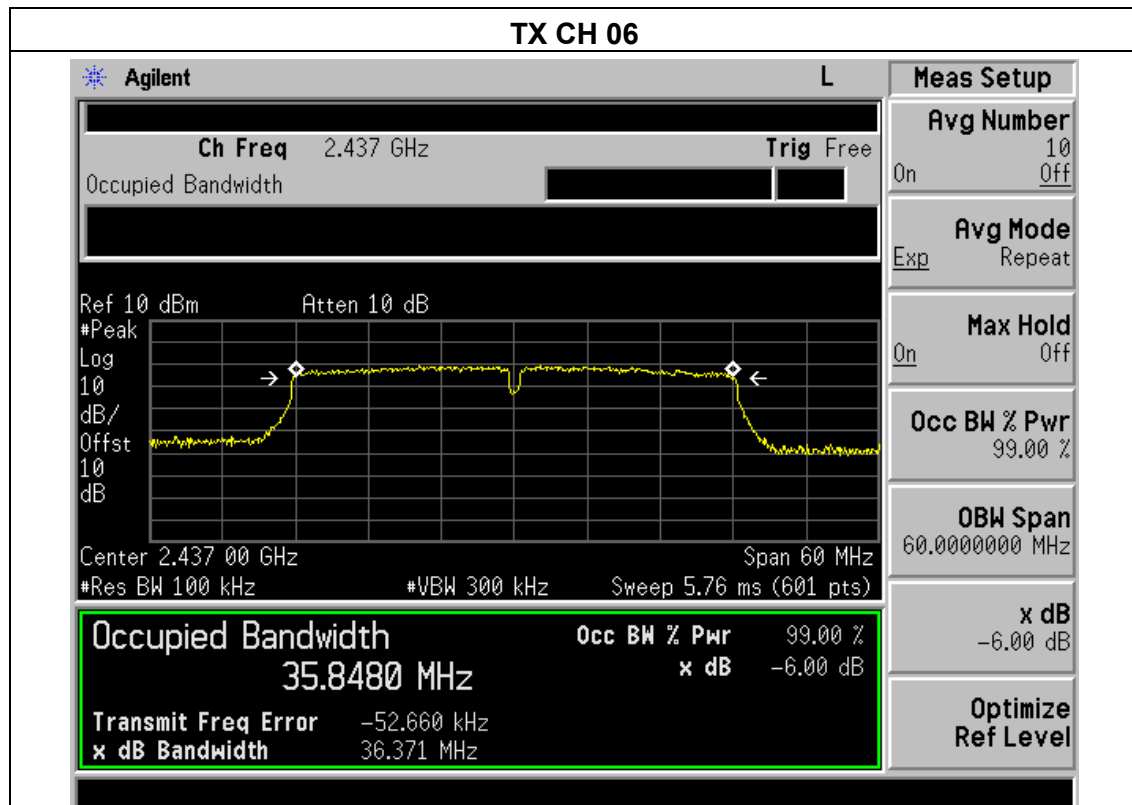
TX CH 11



EUT :	UCOWS Cow Activity Reader	Model Name :	ATS-UCOWS002
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	AC 120V
Test Mode :	TX n Mode(40M) /CH03, CH06, CH09		

Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2422	36.441	500	Pass
Middle	2437	36.371	500	Pass
High	2452	36.407	500	Pass





6. PEAK OUTPUT POWER TEST**6.1 APPLIED PROCEDURES / LIMIT**

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

6.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the Power meter

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP**6.1.4 EUT OPERATION CONDITIONS**

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

6.1.5 TEST RESULTS

EUT :	UCOWS Cow Activity Reader	Model Name :	ATS-UCOWS002
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC 120V
Test Mode :	TX b/g/n20/n40 Mode		

TX 802.11b Mode				
Test Channel	Frequency	Maximum Peak Conducted Output Power (PK)	Maximum Peak Conducted Output Power (AV)	LIMIT
	(MHz)	(dBm)	(dBm)	dBm
CH01	2412	10.75	7.32	30
CH06	2437	10.91	7.63	30
CH11	2462	10.94	7.61	30
TX 802.11g Mode				
CH01	2412	10.55	7.29	30
CH06	2437	10.05	6.94	30
CH11	2462	9.26	5.41	30
TX 802.11n(20) Mode				
CH01	2412	10.75	7.45	30
CH06	2437	10.29	7.26	30
CH11	2462	9.68	6.44	30
TX 802.11n(40) Mode				
CH03	2422	7.33	4.13	30
CH06	2437	6.84	3.53	30
CH09	2452	6.78	3.45	30

7. 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE

APPLICABLE STANDARD

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

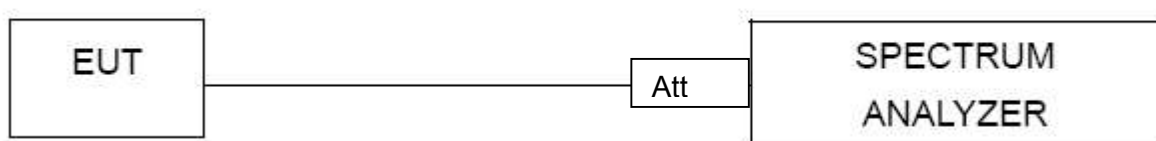
TEST PROCEDURE

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
- Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
- Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
- Repeat above procedures until all measured frequencies were complete.

7.1 DEVIATION FROM STANDARD

No deviation.

7.2 TEST SETUP



7.3 EUT OPERATION CONDITIONS

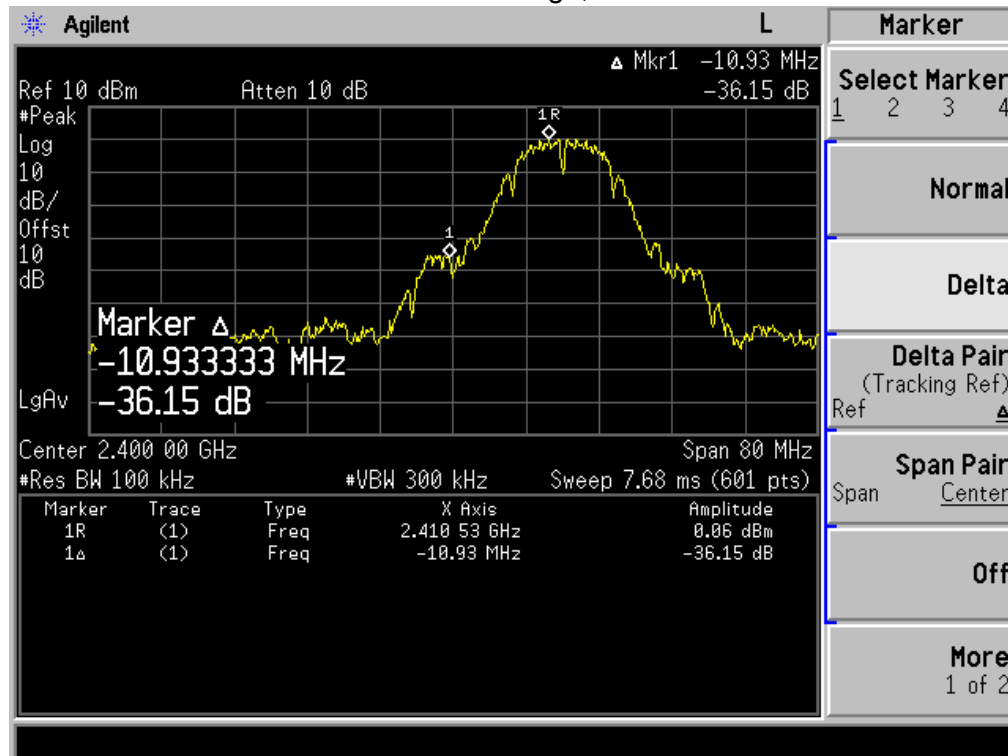
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

7.4 TEST RESULTS

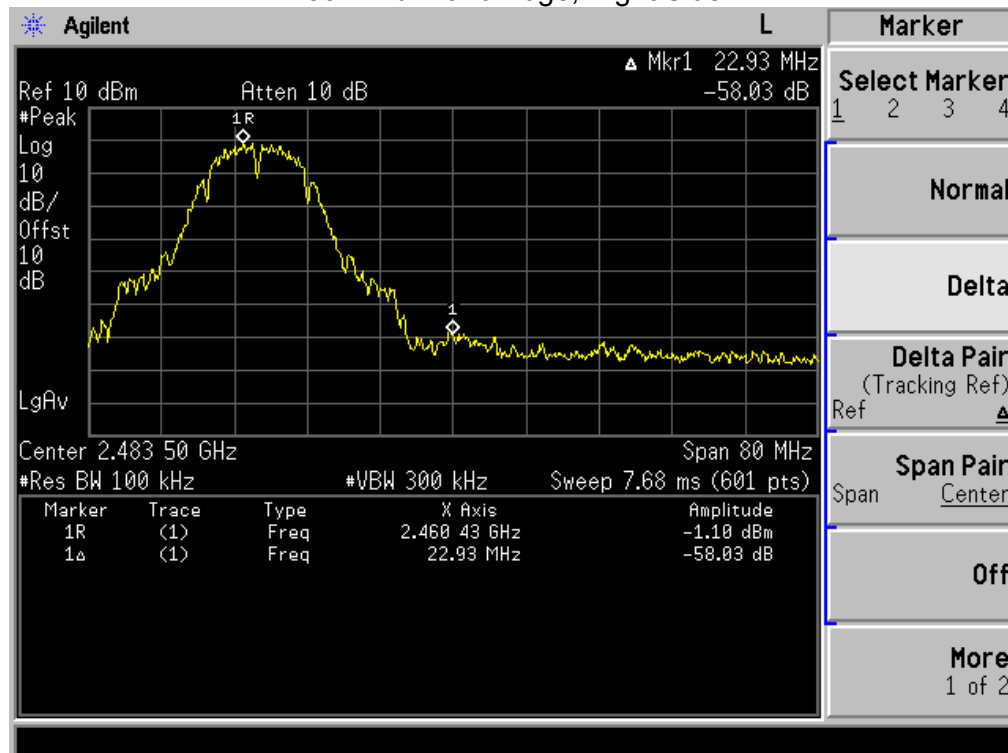
EUT :	UCOWS Cow Activity Reader	Model Name :	ATS-UCOWS002
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	AC 120V

Frequency Band	Delta Peak to band emission (dBc)	> Limit (dBc)	Result
802.11b			
Left-band	36.15	20	Pass
Right-band	58.03	20	Pass
802.11g			
Left-band	31.24	20	Pass
Right-band	45.20	20	Pass
802.11n20			
Left-band	33.14	20	Pass
Right-band	46.30	20	Pass
802.11n40			
Left-band	32.03	20	Pass
Right-band	37.77	20	Pass

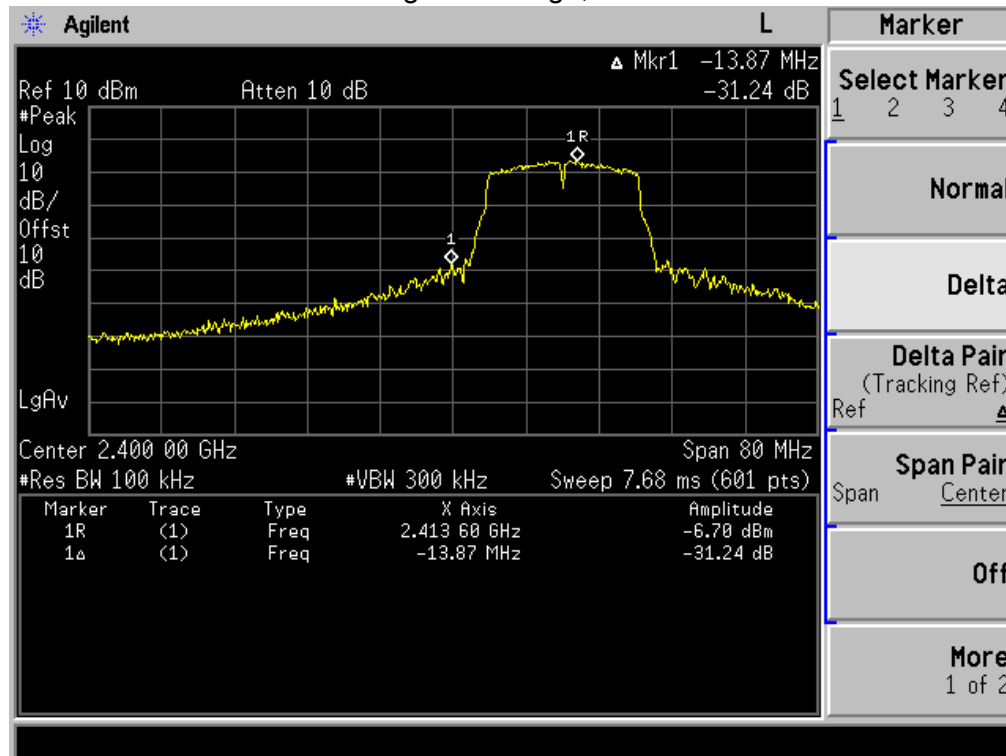
802.11b: Band Edge, Left Side



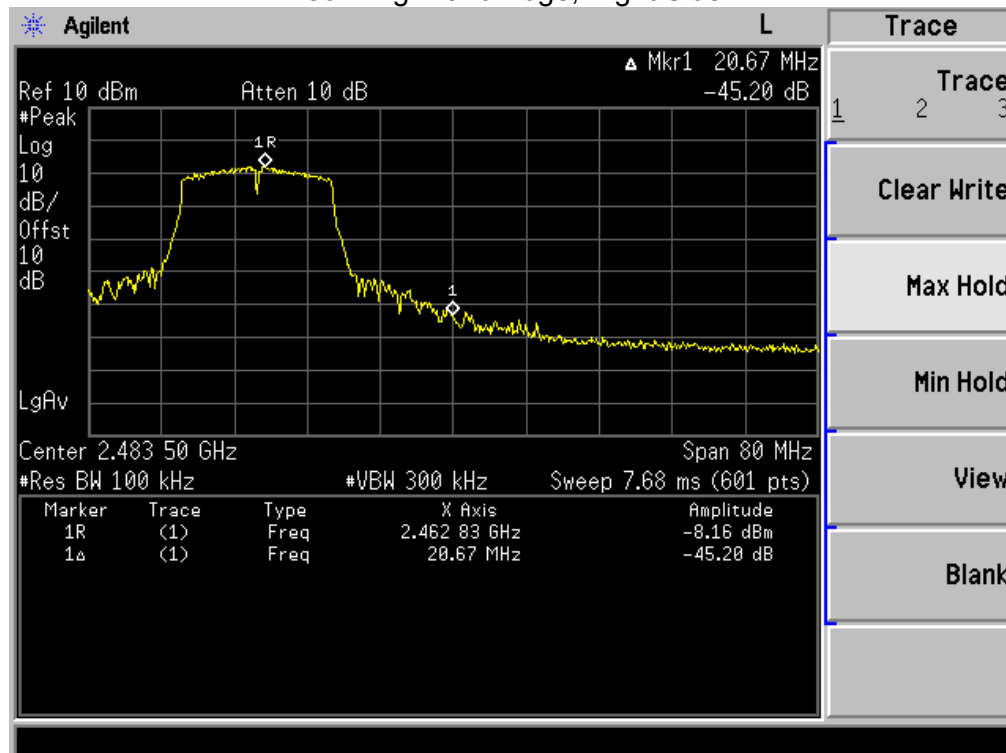
802.11b: Band Edge, Right Side



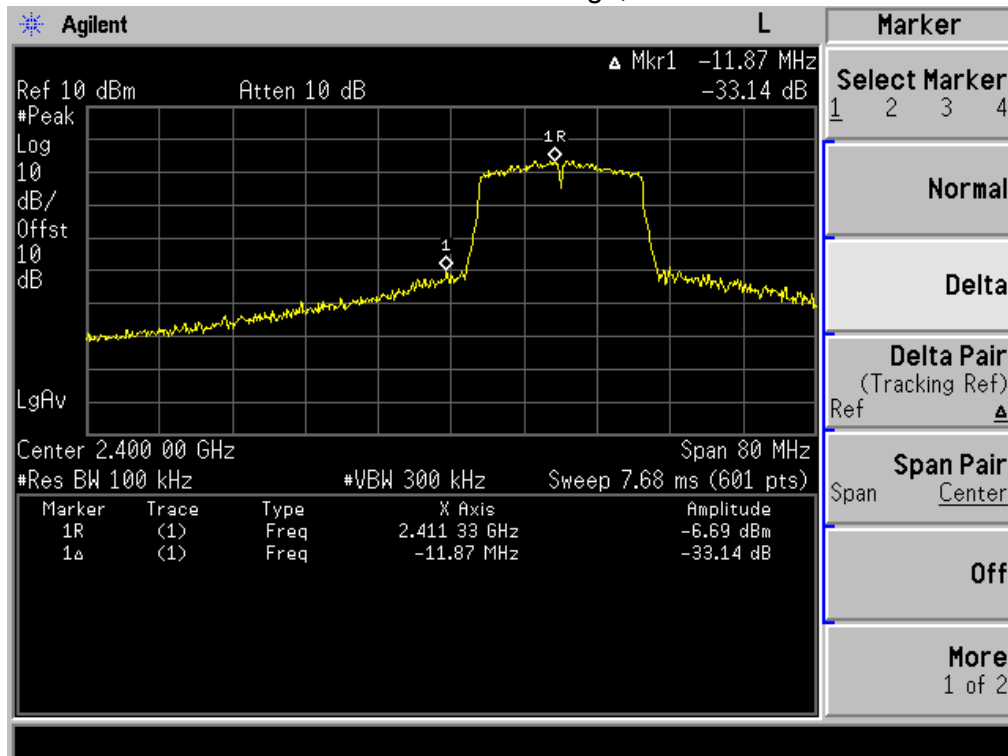
802.11g: Band Edge, Left Side



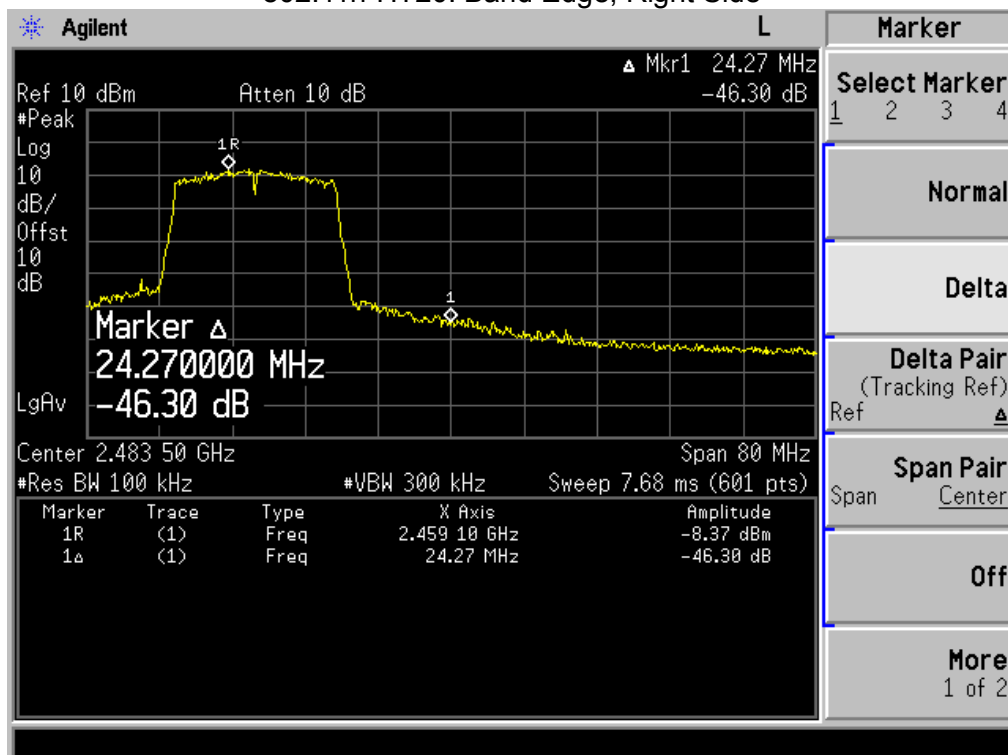
802.11g: Band Edge, Right Side



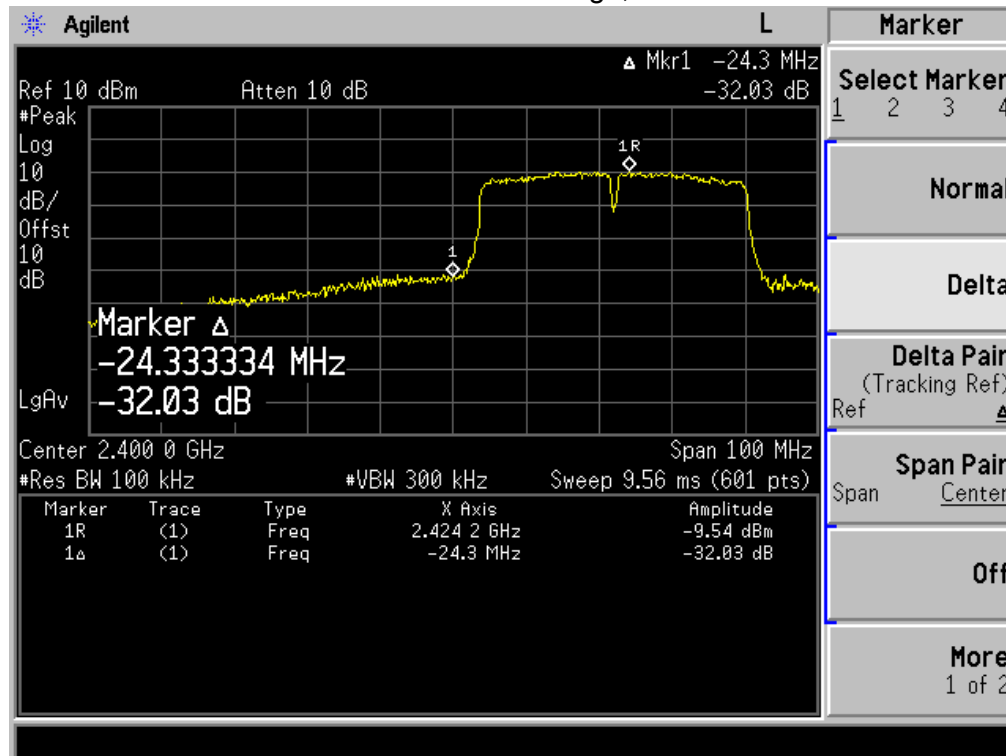
802.11n-HT20: Band Edge, Left Side



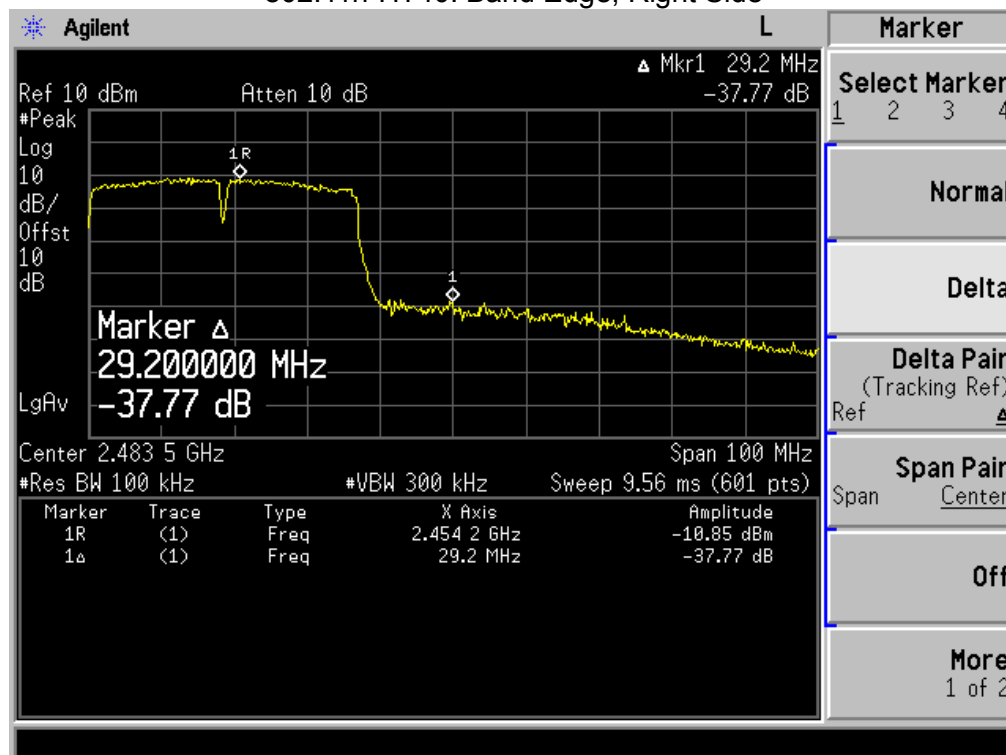
802.11n-HT20: Band Edge, Right Side



802.11n-HT40: Band Edge, Left Side



802.11n-HT40: Band Edge, Right Side



8. ANTENNA REQUIREMENT

8.1 STANDARD REQUIREMENT

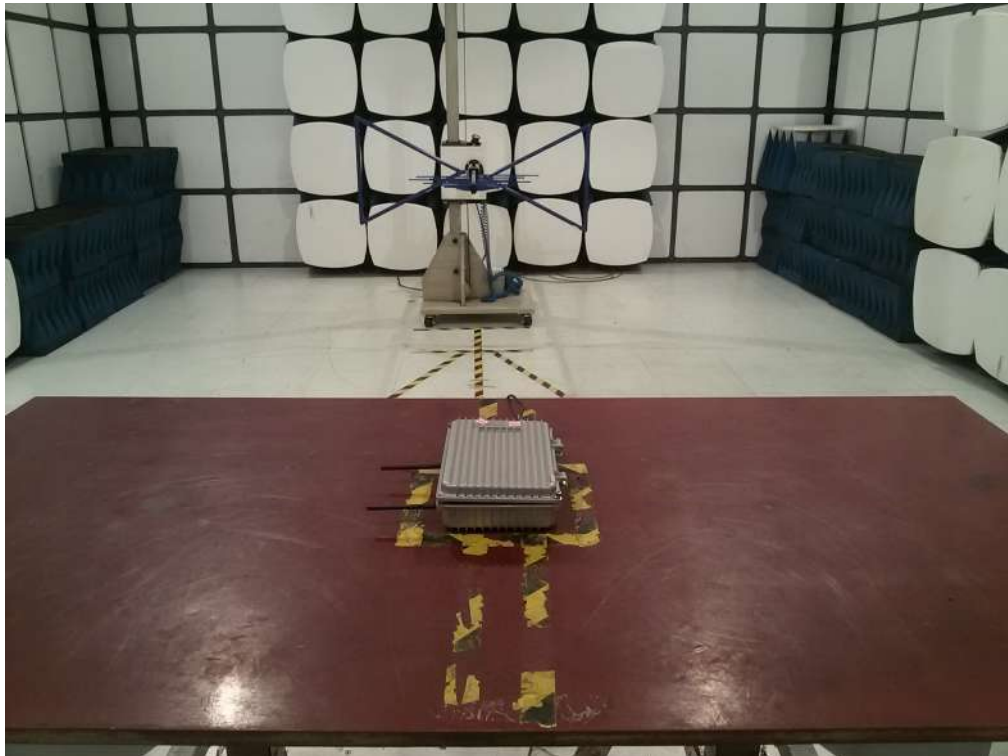
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

8.2 EUT ANTENNA

This is an anti-SMA antenna interface port, user can not replace the antenna, It comply with the standard requirement.

9. EUT TEST PHOTO

Radiated Measurement Photos



Conducted Measurement Photos