FCC RADIO TEST REPORT

FCC ID: 2AB6C-830S

Product：	wireless camera
Trade Name：	N/A
Model Name：	830S
Serial Model：	N/A
Report No.：	NTEK-2014NT0307239F

Prepared for

Shenzhen Seepower Electronics Co., Ltd.

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Prepared by

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TEST RESULT CERTIFICATION

Applicant's name	:	Shenzhen Seepower Electronics Co., Ltd.
Address	:	3 floor,9 Building,Guoxia industrial area ,Sanlian village,Longhua Subdistrict,Bao'an town,Shenzhen,China
Manufacture's Name	:	Shenzhen Seepower Electronics Co., Ltd.
Address	:	3 floor,9 Building,Guoxia industrial area ,Sanlian village,Longhua Subdistrict,Bao'an town,Shenzhen,China

Product description

Product name	:	wireless camera
Model and/or type reference	:	830S
Serial Model：		N/A
Standards	:	FCC Part15.247
Test procedure		ANSI C63.4-2003

This device described above has been tested by NTEK, 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	:	07 Mar. 2014 ~28 Mar. 2014
Date of Issue	:	28 Mar. 2014
Test Result	:	**Pass**

Testing Engineer : Apple Huang

(Apple Huang)

Technical Manager : Brown Lu

(Brown Lu)

Authorized Signatory : Bovey Yang

(Bovey Yang)

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 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING 9
2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED 10
2.5 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE) 11
2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS 12
3 . EMC EMISSION TEST 13
3.1 CONDUCTED EMISSION MEASUREMENT 13
3.1.1 POWER LINE CONDUCTED EMISSION LIMITS 13
3.1.2 TEST PROCEDURE 14
3.1.3 DEVIATION FROM TEST STANDARD 14
3.1.4 TEST SETUP 14
3.1.5 EUT OPERATING CONDITIONS 14
3.1.6 TEST RESULTS 15
3.2 RADIATED EMISSION MEASUREMENT 17
3.2.1 RADIATED EMISSION LIMITS 17
3.2.2 TEST PROCEDURE 18
3.2.3 DEVIATION FROM TEST STANDARD 18
3.2.4 TEST SETUP 19
3.2.5 EUT OPERATING CONDITIONS 20
3.2.6 TEST RESULTS (BELOW 30 MHZ) 21
3.2.7 TEST RESULTS (BETWEEN 30M – 1000 MHZ) 22
3.2.8 TEST RESULTS (ABOVE 1000 MHZ) 23
4 . NUMBER OF HOPPING CHANNEL 27
4.1 APPLIED PROCEDURES / LIMIT 27
4.1.1 TEST PROCEDURE 27
4.1.2 DEVIATION FROM STANDARD 27
4.1.3 TEST SETUP 27
4.1.4 EUT OPERATION CONDITIONS 27
4.1.5 TEST RESULTS 28
5 . AVERAGE TIME OF OCCUPANCY 30
5.1 APPLIED PROCEDURES / LIMIT 30

Table of Contents

Page

5.1.1 TEST PROCEDURE 30
5.1.2 DEVIATION FROM STANDARD 30
5.1.3 TEST SETUP 31
5.1.4 EUT OPERATION CONDITIONS 31
5.1.5 TEST RESULTS 32

6 . HOPPING CHANNEL SEPARATION MEASUREMENT 34

6.1 APPLIED PROCEDURES / LIMIT 34
6.1.1 TEST PROCEDURE 34
6.1.2 DEVIATION FROM STANDARD 34
6.1.3 TEST SETUP 34
6.1.4 EUT OPERATION CONDITIONS 34
6.1.5 TEST RESULTS 35

7 . BANDWIDTH TEST 37

7.1 APPLIED PROCEDURES / LIMIT 37
7.1.1 TEST PROCEDURE 37
7.1.2 DEVIATION FROM STANDARD 37
7.1.3 TEST SETUP 37
7.1.4 EUT OPERATION CONDITIONS 37
7.1.5 TEST RESULTS 38

8 . PEAK OUTPUT POWER TEST 40

8.1 APPLIED PROCEDURES / LIMIT 40
8.1.1 TEST PROCEDURE 40
8.1.2 DEVIATION FROM STANDARD 40
8.1.3 TEST SETUP 40
8.1.4 EUT OPERATION CONDITIONS 40
8.1.5 TEST RESULTS 41

9 . 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE 43

9.1 DEVIATION FROM STANDARD 43
9.2 TEST SETUP 43
9.3 EUT OPERATION CONDITIONS 43
9.4 TEST RESULTS 44

10 . ANTENNA REQUIREMENT 47

10.1 STANDARD REQUIREMENT 47

10.2 EUT ANTENNA 47

11 . EUT TEST PHOTO 48

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)(1)	Hopping Channel Separation	PASS	
15.247(b)(1)	Peak Output Power	PASS	
15.247(c)	Radiated Spurious Emission	PASS	
15.247(a)(iii)	Number of Hopping Frequency	PASS	
15.247(a)(iii)	Dwell Time	PASS	
15.247(a)(1)	Bandwidth	PASS	
15.205	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

NTEK Testing Technology Co., Ltd
Add. : 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen P.R. China.
FCC Registration No.:238937; IC Registration No.:9270A-1
CNAS Registration No.:L5516

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	wireless camera
Trade Name	N/A
Model Name	830S
Serial Model	N/A
Model Difference	N/A
Product Description	The EUT is a wireless camera Operation Frequency: 2410.875~2471.625 MHz Modulation Type: GFSK Number Of Channel 19 CH Antenna Designation: Please see Note 3. Output Power(Conducted): 17.37dBm 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.
Adapter	Model:CFD0605A Input: 100-240V~50/60Hz, 0.2A Max Output: 5V⎓, 1.0A
Battery	N/A
Connecting I/O Port(s)	Please refer to the User's Manual

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2.

Channel List

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2410.875	07	2434.500	14	2458.125
01	2414.250	08	2437.875	15	2461.500
02	2417.625	09	2441.250	16	2464.875
03	2421.000	10	2444.625	17	2468.250
04	2424.375	11	2448.000	18	2471.625
05	2427.750	12	2451.375		
06	2431.125	13	2454.750		

3.

Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	N/A	N/A	External Antenna	N/A	2.0	TX 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	CH00
Mode 2	CH09
Mode 3	CH18
Mode 4	normal link

For Conducted Emission	
Final Test Mode	Description
Mode 4	normal link

For Radiated Emission	
Final Test Mode	Description
Mode 1	CH00
Mode 2	CH09
Mode 3	CH18

Note:

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

(2) The EUT use new battery.

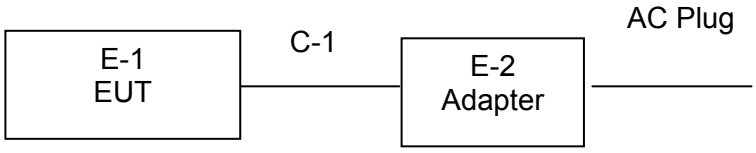
(3)The data rate was set in 1Mbps for radiated emission due to the highest RF output power.

2.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of FHSS

Test software Version	Test program: Broadcom		
Frequency	2410.875 MHz	2441.250 MHz	2471.625 MHz
Parameters	DEF	DEF	DEF

2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



2.5 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	wireless camera	N/A	830S	N/A	EUT
E-2	Adapter	N/A	CFD0605A	N/A	

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	0.8m	

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.
(3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	MY45108040	2013.07.06	2014.07.05	1 year
2	Test Receiver	R&S	ESPI	101318	2013.06.07	2014.06.06	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2013.07.06	2014.07.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2013.06.07	2014.06.06	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2013.06.07	2014.06.06	1 year
6	Horn Antenna	EM	EM-AH-10180	2011071402	2013.07.06	2014.07.05	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2013.07.06	2014.07.05	1 year
8	Amplifier	EM	EM-30180	060538	2013.12.22	2014.12.21	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2013.06.08	2014.06.07	1 year
10	Power Meter	R&S	NRVS	100696	2013.07.06	2014.07.05	1 year
11	Power Sensor	R&S	URV5-Z4	0395.1619.05	2013.07.06	2014.07.05	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	2013.06.06	2014.06.05	1 year
2	LISN	R&S	ENV216	101313	2013.08.24	2014.08.23	1 year
3	LISN	EMCO	3816/2	00042990	2013.08.24	2014.08.23	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2013.06.07	2014.06.06	1 year
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	2013.06.07	2014.06.06	1 year
6	Absorbing clamp	R&S	MOS-21	100423	2013.06.08	2014.06.07	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

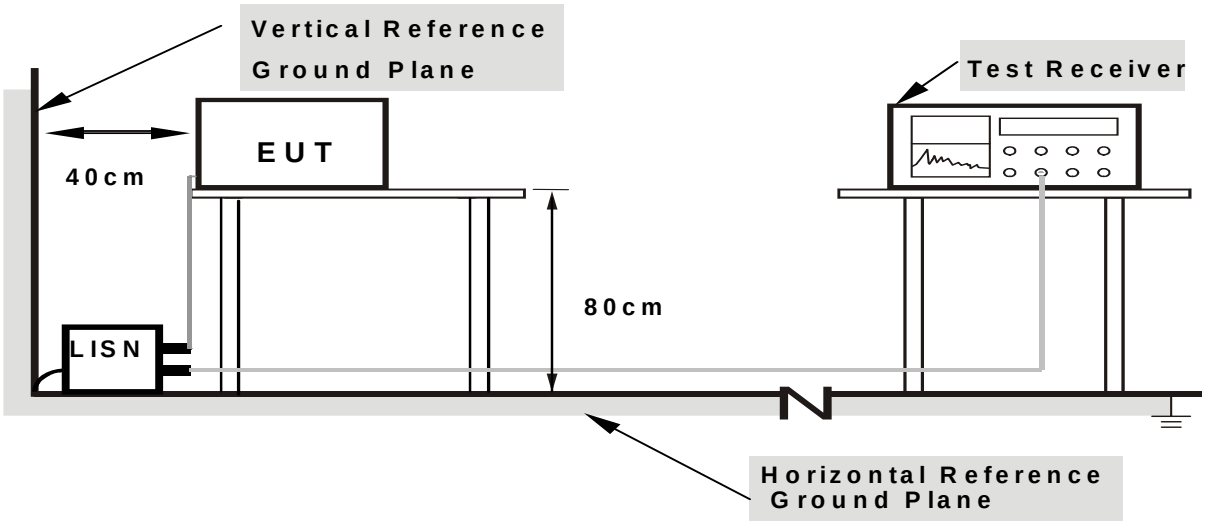
3.1.2 TEST PROCEDURE

a. 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.
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.

3.1.3 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 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.

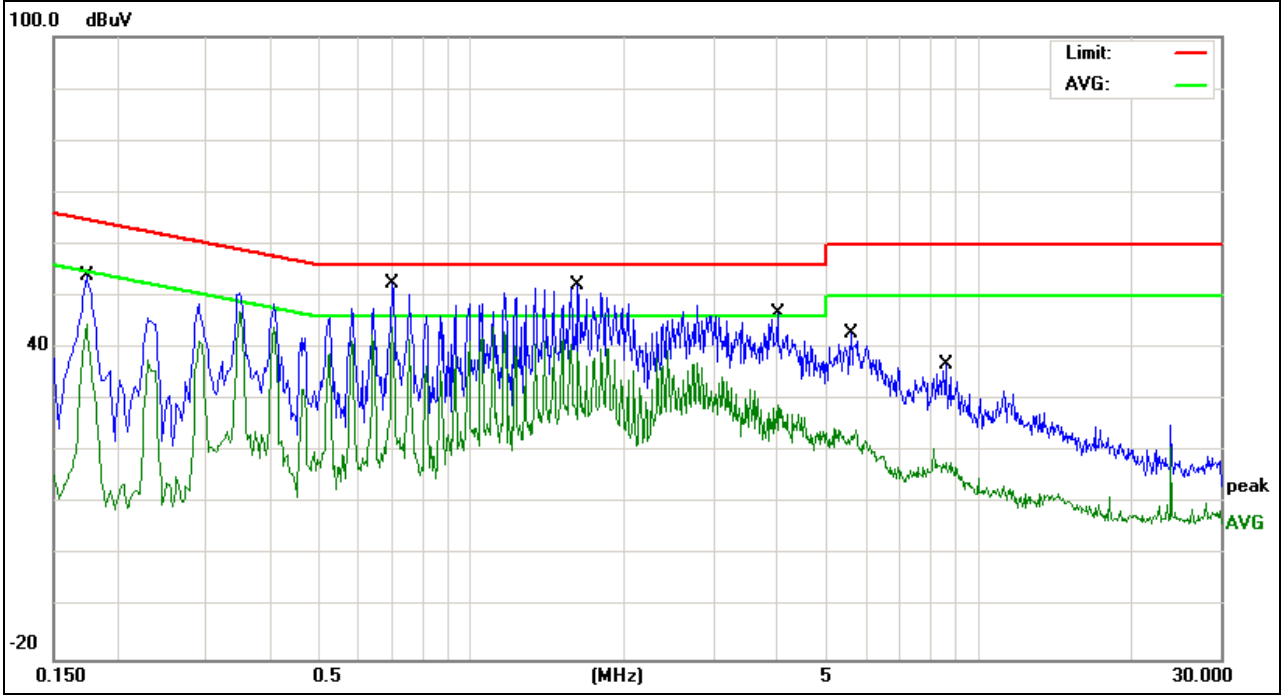
3.1.6 TEST RESULTS

EUT：	wireless camera	Model Name ：	830S
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 5.0V from adapter AC 120V/60Hz	Test Mode：	Mode 4

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1740	44.51	9.56	54.07	64.76	-10.69	AVG
0.1740	35.16	9.56	44.72	54.76	-10.04	QP
0.6980	42.89	9.53	52.42	56.00	-3.58	QP
0.6980	32.47	9.53	42.00	46.00	-4.00	AVG
1.6260	42.75	9.54	52.29	56.00	-3.71	QP
1.6260	31.33	9.54	40.87	46.00	-5.13	AVG
4.0140	37.15	9.59	46.74	56.00	-9.26	QP
4.0140	19.39	9.59	28.98	46.00	-17.02	AVG
5.5939	33.19	9.63	42.82	60.00	-17.18	QP
5.5939	14.71	9.63	24.34	50.00	-25.66	AVG
8.6259	27.12	9.70	36.82	60.00	-23.18	QP
8.6259	10.86	9.70	20.56	50.00	-29.44	AVG

Remark:

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

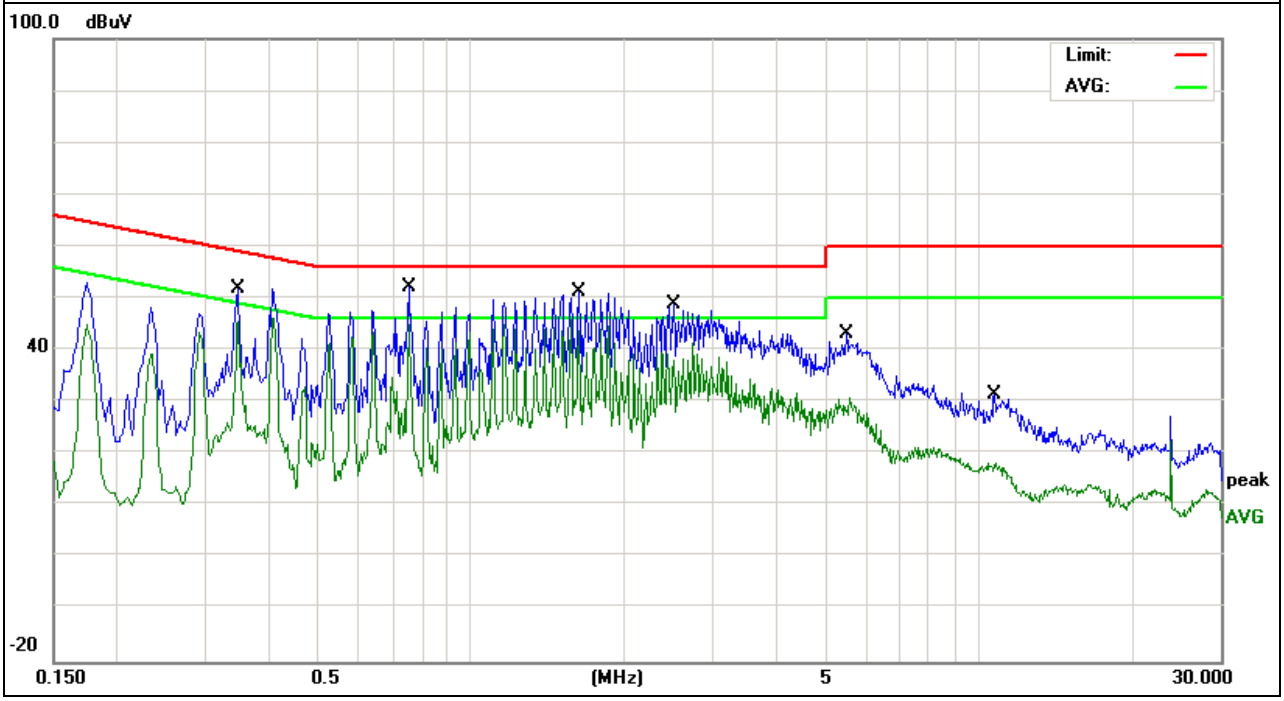


EUT：	wireless camera	Model Name ：	830S
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 5.0V from adapter AC 120V/60Hz	Test Mode：	Mode 4

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.3464	42.27	9.50	51.77	59.05	-7.28	QP
0.3464	36.14	9.50	45.64	49.05	-3.41	AVG
0.7539	42.63	9.53	52.16	56.00	-3.84	QP
0.7539	33.45	9.53	42.98	46.00	-3.02	AVG
1.6300	41.71	9.54	51.25	56.00	-4.75	QP
1.6300	34.14	9.54	43.68	46.00	-2.32	AVG
2.5020	39.40	9.56	48.96	56.00	-7.04	QP
2.5020	28.42	9.56	37.98	46.00	-8.02	AVG
5.4818	33.56	9.62	43.18	60.00	-16.82	QP
5.4818	21.22	9.62	30.84	50.00	-19.16	AVG
10.7819	21.79	9.75	31.54	60.00	-28.46	QP
10.7819	8.43	9.75	18.18	50.00	-31.82	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 A (dBuV/m) (at 3M)		Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE	PEAK	AVERAGE
Above 1000	80	60	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	5th 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

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 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; 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:

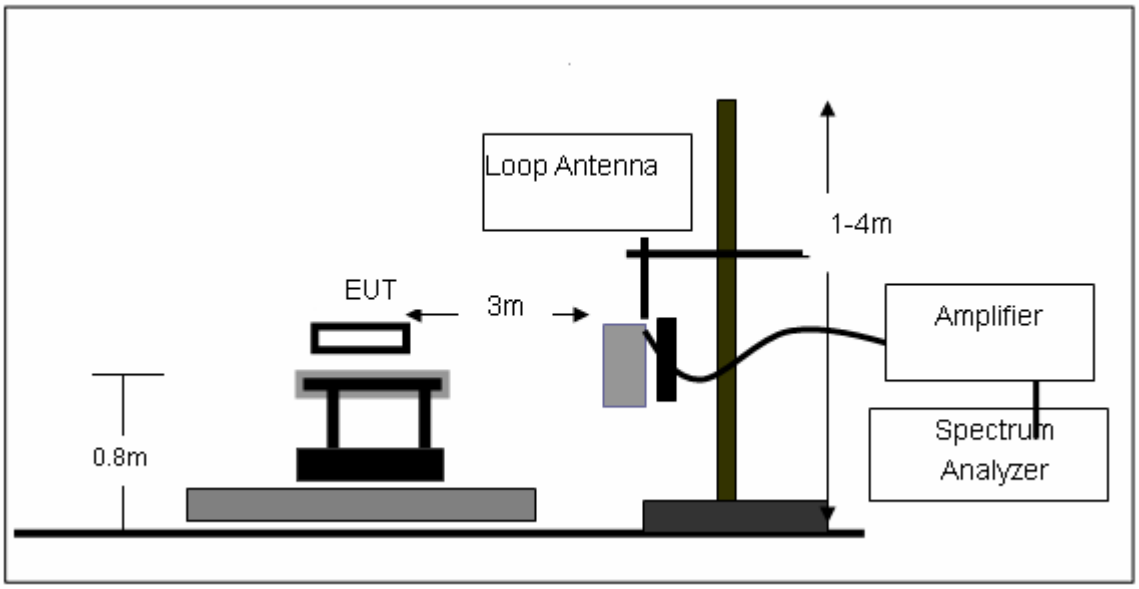
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

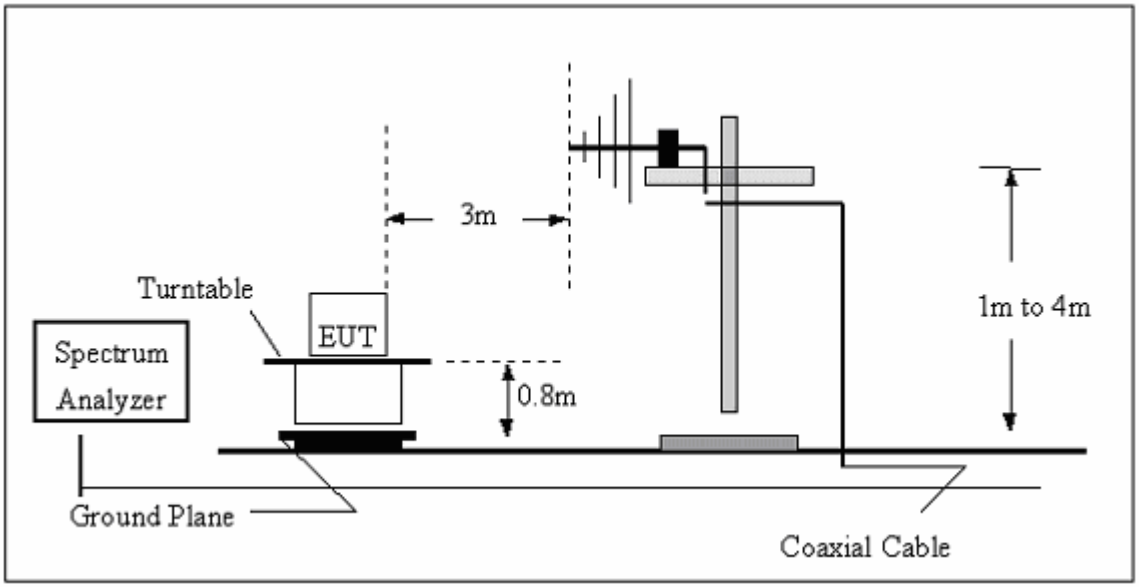
No deviation

3.2.4 TEST SETUP

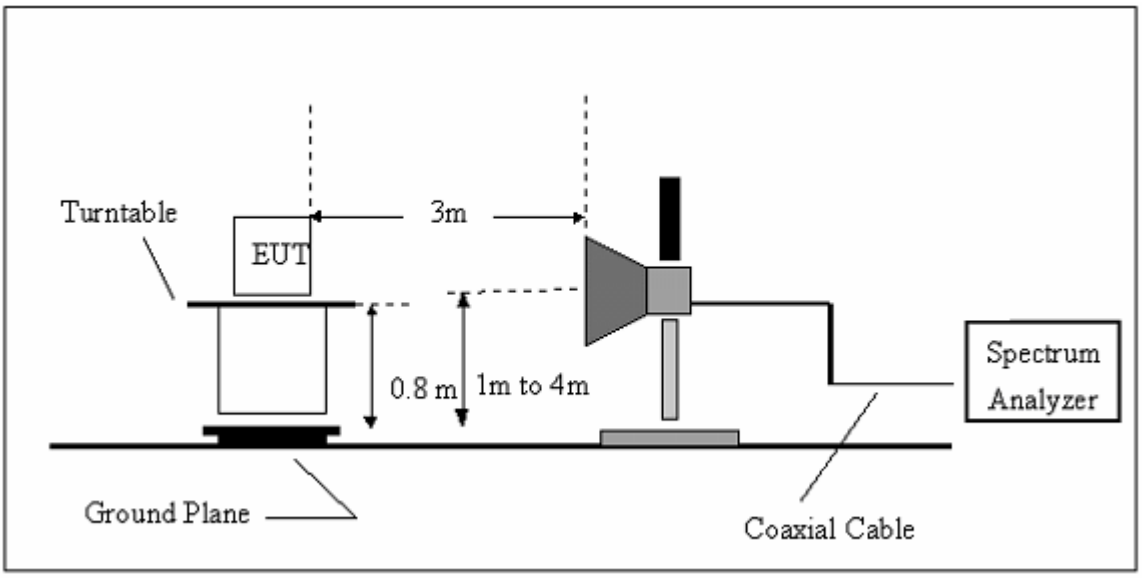
（A）Radiated Emission Test-Up Frequency Below 30MHz



（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 (BELOW 30 MHZ)

EUT：	wireless camera	Model Name ：	830S
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 5.0V from adapter AC 120V/60Hz
Test Mode ：	TX	Polarization :	---

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

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.

3.2.7 TEST RESULTS (BETWEEN 30M – 1000 MHZ)

EUT：	wireless camera	Model Name ：	830S
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Test Mode：	TX
Test Voltage ：	DC 5.0V from adapter AC 120V/60Hz		

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detect or Type	Comment
Below 1G							
47.9938	18.11	9.16	27.27	40.00	-12.73	QP	Vertical
119.8555	21.03	12.09	33.12	43.50	-10.38	QP	Vertical
143.8293	22.84	12.06	34.90	43.50	-8.60	QP	Vertical
239.9874	27.75	11.65	39.40	46.00	-6.60	QP	Vertical
336.0350	20.26	16.03	36.29	46.00	-9.71	QP	Vertical
866.0878	12.61	27.40	40.01	46.00	-5.99	QP	Vertical
31.0703	6.38	17.86	24.24	40.00	-15.76	QP	Horizontal
191.7450	22.87	8.99	31.86	43.50	-11.64	QP	Horizontal
239.9874	26.75	11.65	38.40	46.00	-7.60	QP	Horizontal
336.0350	23.94	16.03	39.97	46.00	-6.03	QP	Horizontal
672.8444	14.58	23.87	38.45	46.00	-7.55	QP	Horizontal
768.7481	14.11	26.20	40.31	46.00	-5.69	QP	Horizontal

3.2.8 **TEST RESULTS (ABOVE 1000 MHZ)**

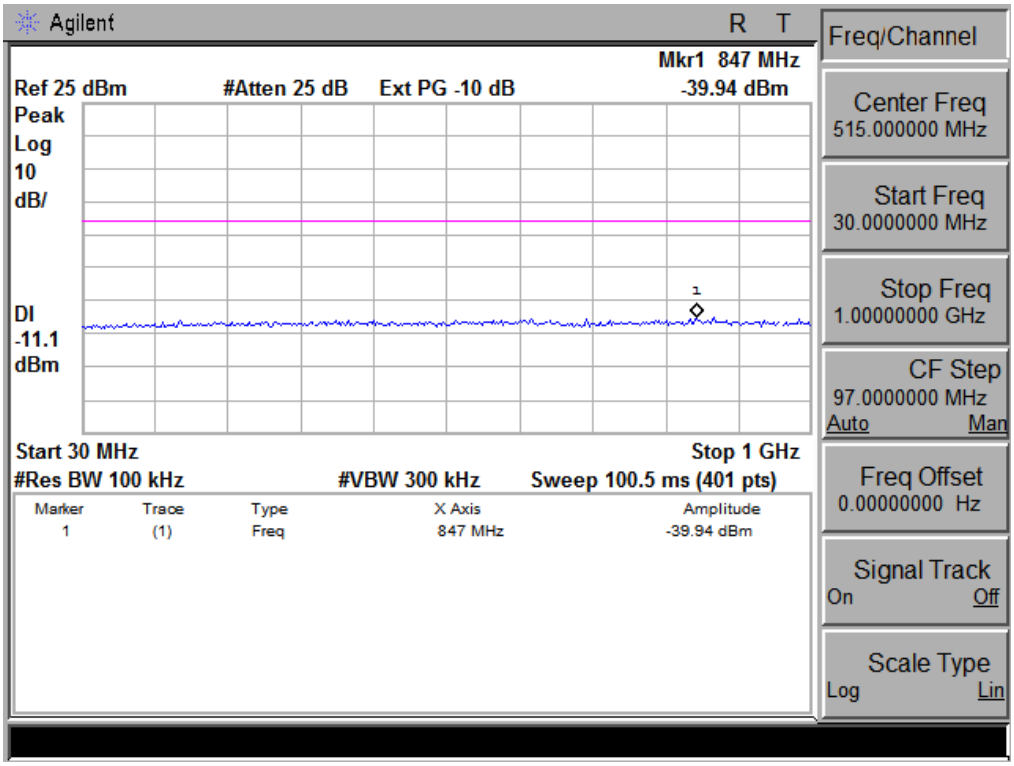
EUT：	wireless camera	Model Name ：	830S
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Test Mode：	TX
Test Voltage ：	DC 5.0V from adapter AC 120V/60Hz		

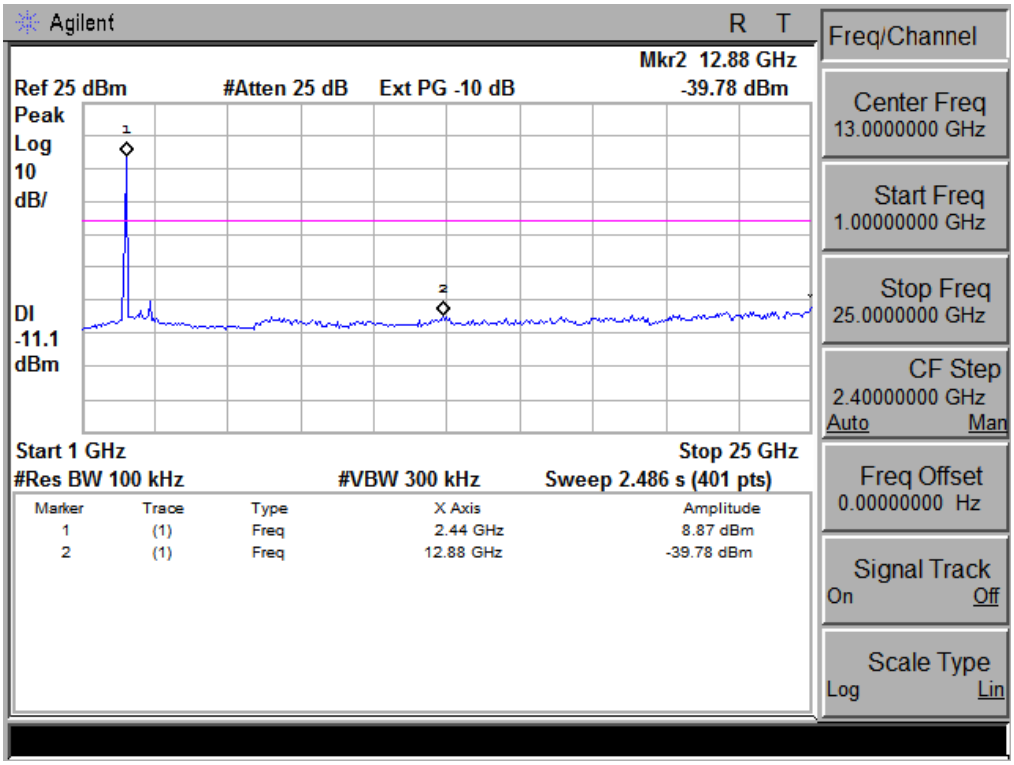
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
Low Channel (2410.875 MHz)-Above 1G							
4821.75	54.85	10.44	65.29	74	-8.71	Pk	Vertical
4821.75	36.69	10.44	47.13	54	-6.87	AV	Vertical
7232.625	55.37	12.40	67.77	74	-6.23	Pk	Vertical
7232.625	33.14	12.40	45.54	54	-8.46	AV	Vertical
4821.75	57.88	10.44	68.32	74	-5.68	Pk	Horizontal
4821.75	36.26	10.44	46.7	54	-7.30	AV	Horizontal
7232.625	53.17	12.40	65.57	74	-8.43	Pk	Horizontal
7232.625	32.44	12.40	44.84	54	-9.16	AV	Horizontal
Mid Channel (2441.250 MHz)-Above 1G							
4882.5	53.69	10.36	64.05	74	-9.95	Pk	Vertical
4882.5	34.31	10.36	44.67	54	-9.33	AV	Vertical
7323.75	53.17	12.77	65.94	74	-8.06	Pk	Vertical
7323.75	34.52	12.77	47.29	54	-6.71	AV	Vertical
4882.5	58.53	10.36	68.89	74	-5.11	Pk	Horizontal
4882.5	37.64	10.36	48.00	54	-6.00	AV	Horizontal
7323.75	52.27	12.77	65.04	74	-8.96	Pk	Horizontal
7323.75	32.98	12.77	45.75	54	-8.25	AV	Horizontal
High Channel (2471.625 MHz)- Above 1G							
4943.25	57.48	10.48	67.96	74	-6.04	Pk	Vertical
4943.25	36.64	10.48	47.12	54	-6.88	AV	Vertical
7414.875	52.55	12.82	65.37	74	-8.63	Pk	Vertical
7414.875	32.31	12.82	45.13	54	-8.87	AV	Vertical
4943.25	52.77	10.48	63.25	74	-10.75	Pk	Horizontal
4943.25	36.2	10.48	46.68	54	-7.32	AV	Horizontal
7414.875	52.52	12.82	65.34	74	-8.66	Pk	Horizontal
7414.875	31.35	12.82	44.17	54	-9.83	AV	Horizontal

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Emission Level = Meter Reading + Factor
Margin = Emission Level- Limit

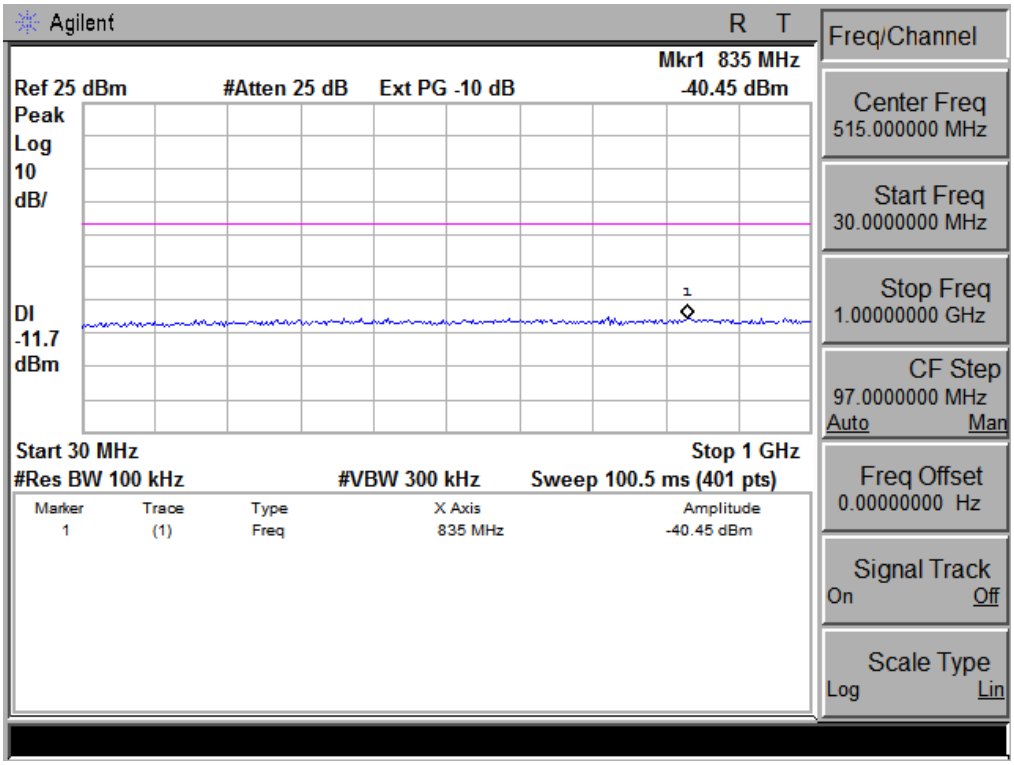
Conducted Spurious Emissions at Antenna Port:

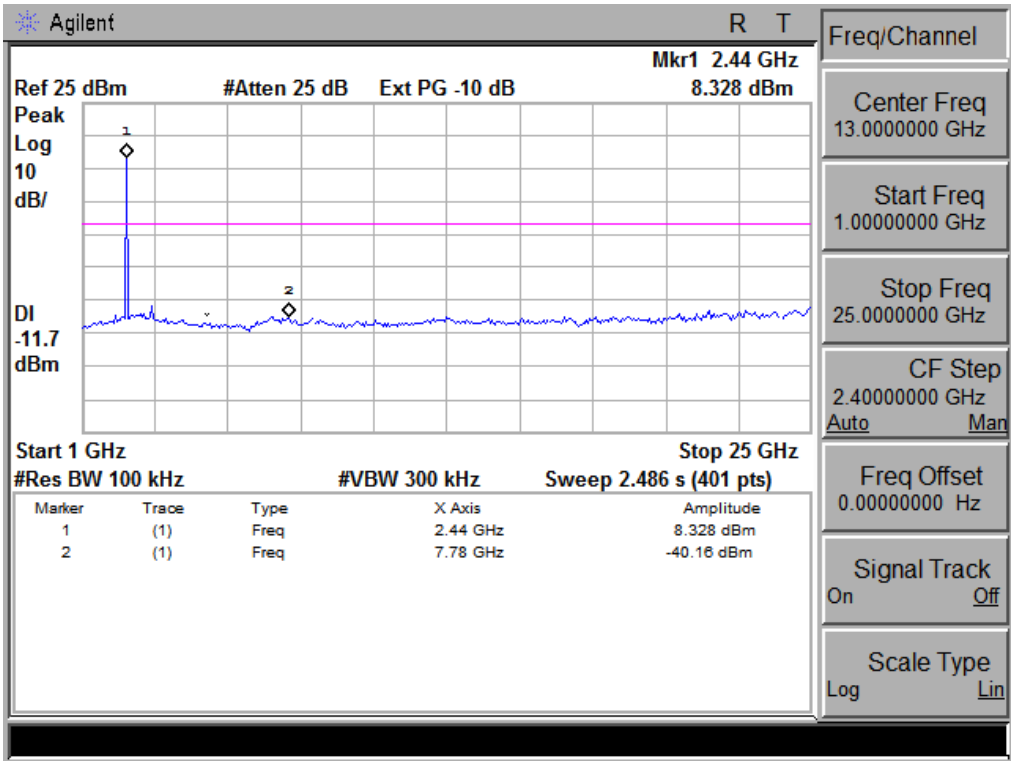
Low Channel –CH00



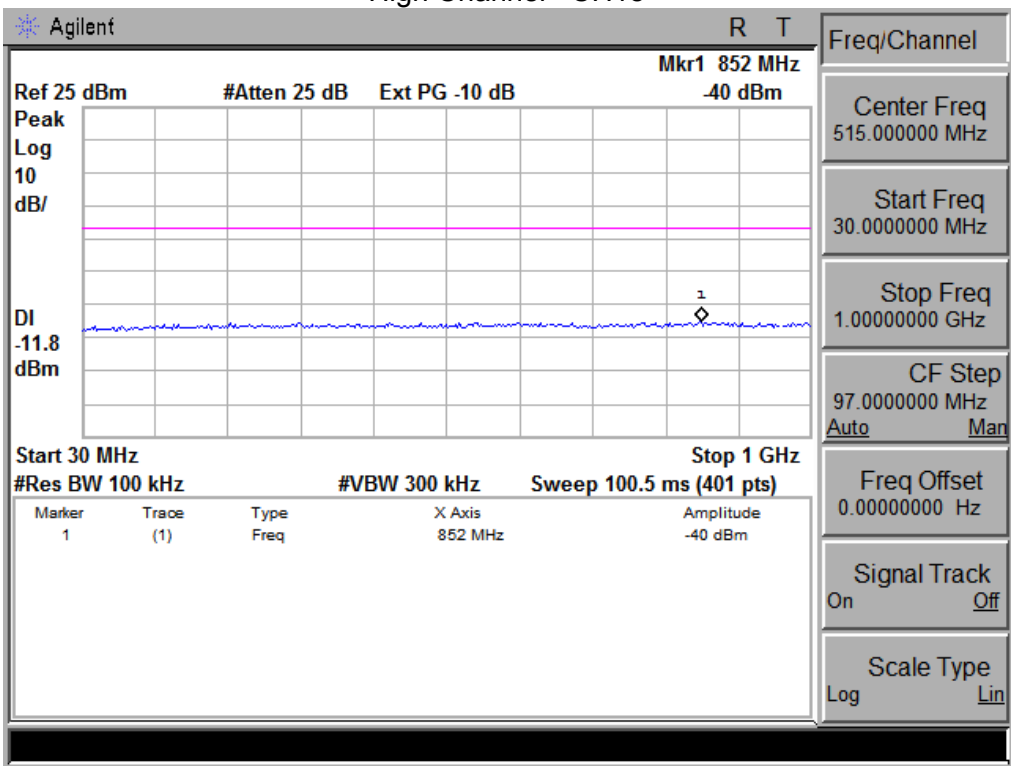


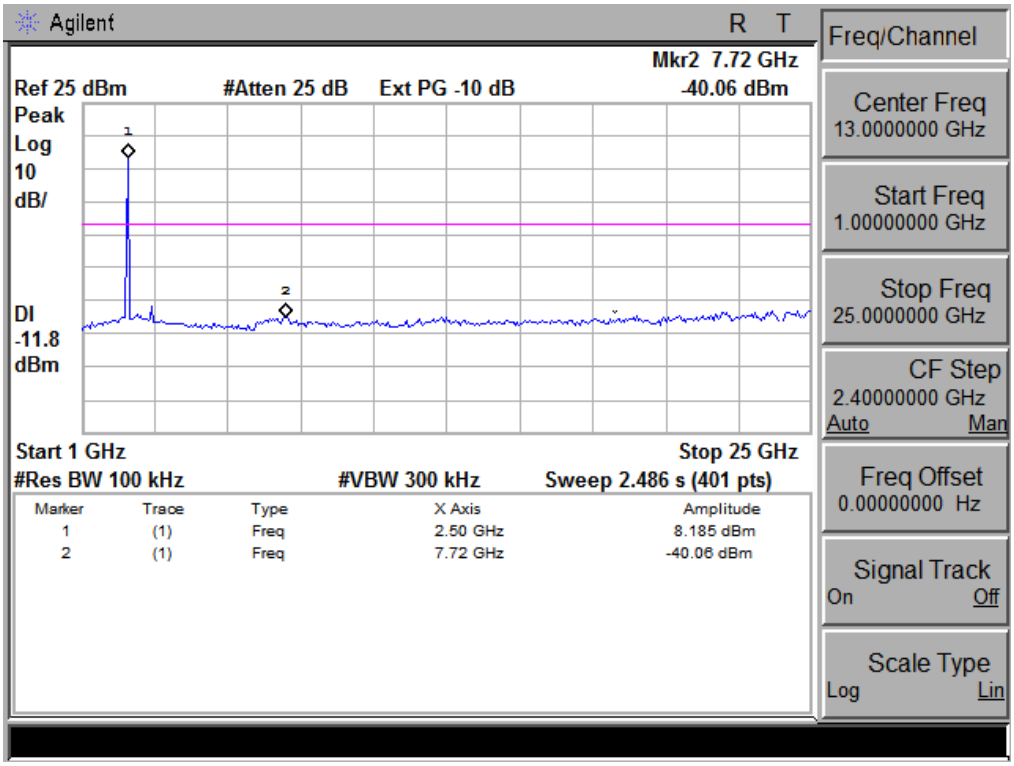
Middle Channel –CH09





High Channel –CH18





4. NUMBER OF HOPPING CHANNEL

4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Number of Hopping Channel	≥15	2400-2483.5	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	= the frequency band of operation
RB	RBW=1MHz
VB	VBW ≥ RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

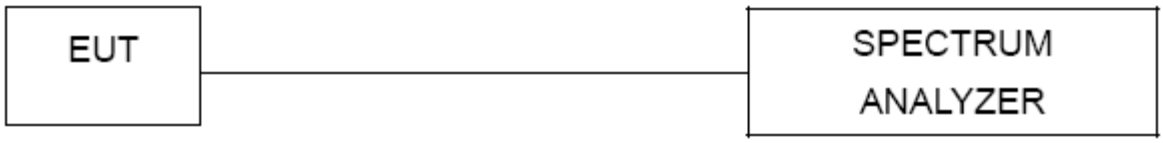
4.1.1 TEST PROCEDURE

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= 1MHz, VBW=1MHz, Sweep time = Auto.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



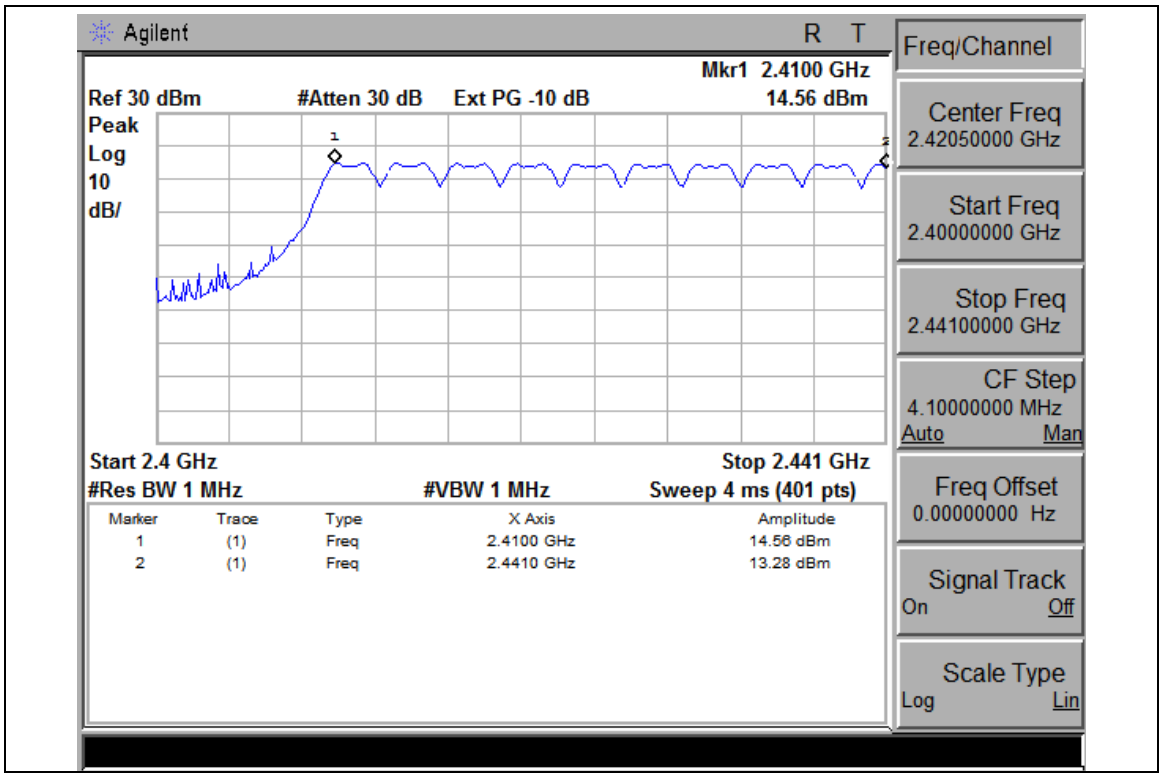
4.1.4 EUT OPERATION CONDITIONS

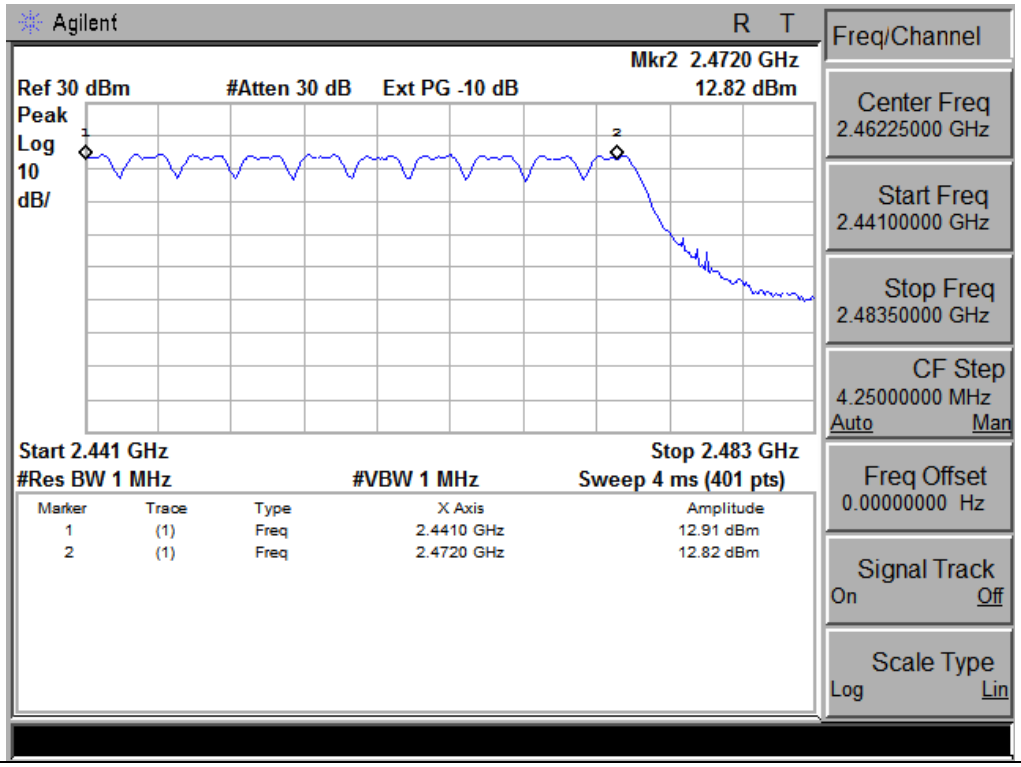
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

4.1.5 TEST RESULTS

EUT：	wireless camera	Model Name ：	830S
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1015 hPa	Test Voltage ：	DC 5.0V from adapter AC 120V/60Hz
Test Mode ：	Hopping Mode		

Number of Hopping Channel	19




Agilent
R T
Mkr2 2.4720 GHz
Ref 30 dBm
#Atten 30 dB
Ext PG -10 dB
12.82 dBm
Peak
Log
10
dB/
Start 2.441 GHz
#Res BW 1 MHz
#VBW 1 MHz
Stop 2.483 GHz
Sweep 4 ms (401 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.4410 GHz 12.91 dBm
2 (1) Freq 2.4720 GHz 12.82 dBm
Freq/Channel
Center Freq
2.46225000 GHz
Start Freq
2.44100000 GHz
Stop Freq
2.48350000 GHz
CF Step
4.25000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

5. AVERAGE TIME OF OCCUPANCY

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Average Time of Occupancy	0.4sec	2400-2483.5	PASS

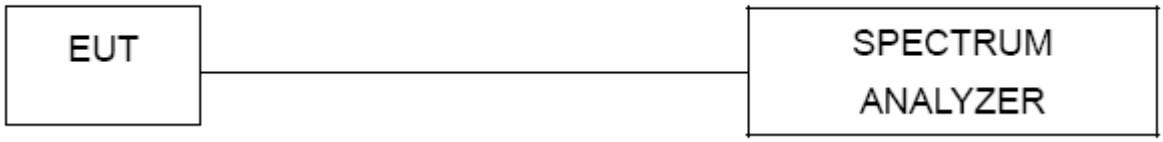
5.1.1 TEST PROCEDURE

a. The transmitter output (antenna port) was connected to the spectrum analyzer
b. Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
d. Sweep Time is more than once pulse time.
e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
f. Measure the maximum time duration of one single pulse.
g. Set the EUT for packet transmitting.
h. Measure the maximum time duration of one single pulse.
i. A Period Time = (channel number)*0.4
Time Slot: Reading * (180/2)*7.6/(channel number)

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



5.1.4 EUT OPERATION CONDITIONS

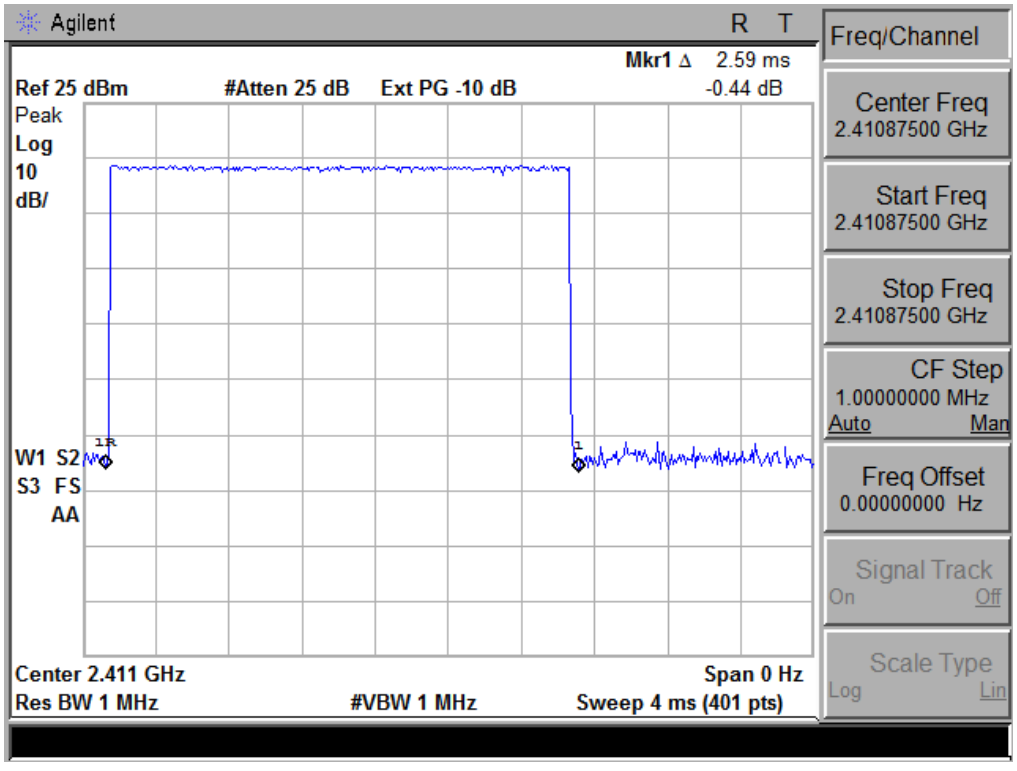
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.1.5 TEST RESULTS

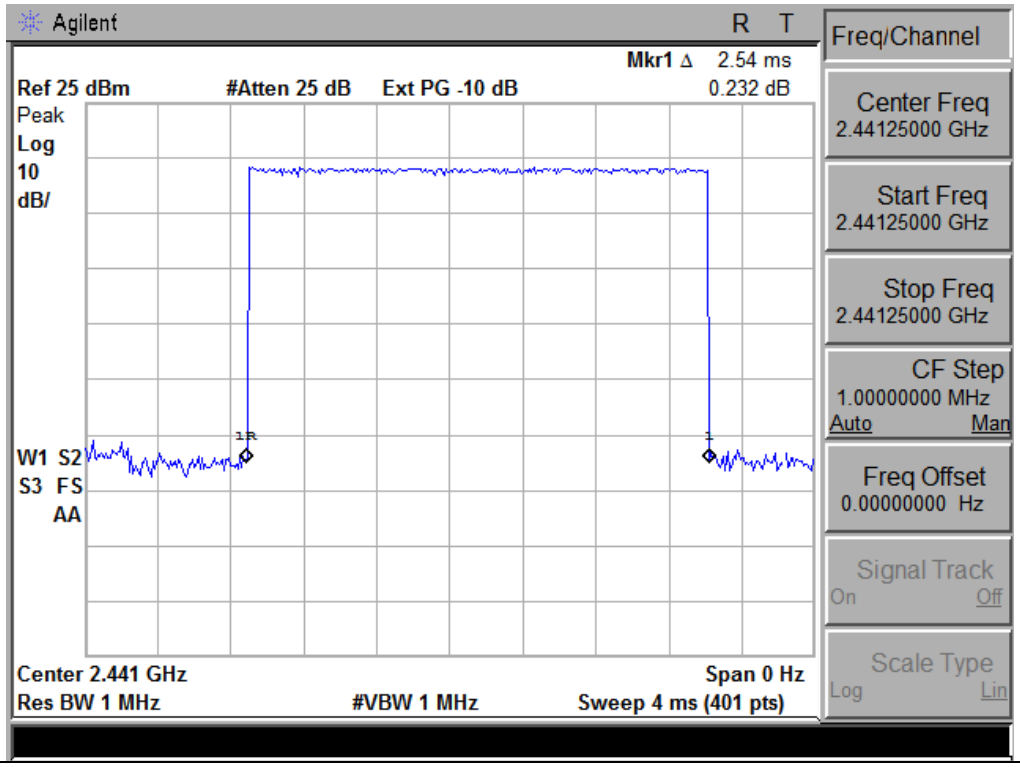
EUT：	wireless camera	Model Name ：	830S
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 5.0V from adapter AC 120V/60Hz
Test Mode ：	CH00/CH09/CH18		

Frequency	Pulse Duration	Dwell Time	Limits
	(ms)	(s)	(s)
2410.875 MHz	2.59	0.09	0.4
2441.250 MHz	2.54	0.09	0.4
2471.625 MHz	2.55	0.09	0.4

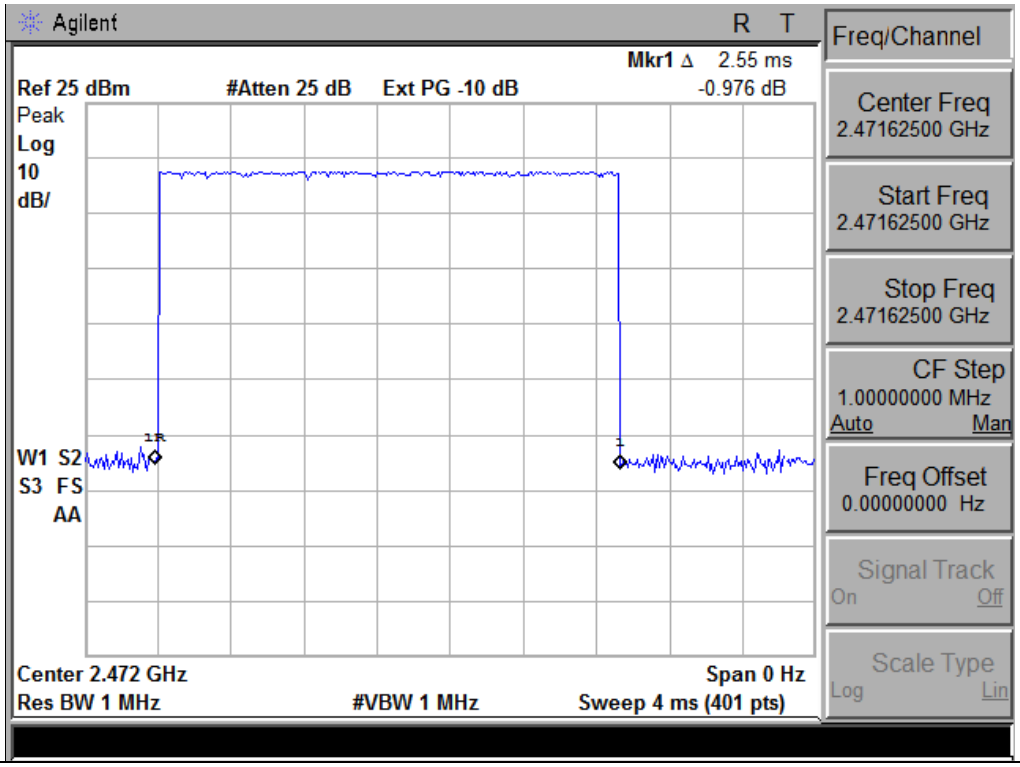
CH00



CH09


Agilent
R T
Mkr1 Δ 2.54 ms
0.232 dB
Ref 25 dBm
#Atten 25 dB
Ext PG -10 dB
Peak
Log
10
dB/
W1 S2
S3 FS
AA
Center 2.441 GHz
Res BW 1 MHz
#VBW 1 MHz
Span 0 Hz
Sweep 4 ms (401 pts)
Freq/Channel
Center Freq
2.44125000 GHz
Start Freq
2.44125000 GHz
Stop Freq
2.44125000 GHz
CF Step
1.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

CH18


Agilent
R T
Mkr1 Δ 2.55 ms
-0.976 dB
Ref 25 dBm
#Atten 25 dB
Ext PG -10 dB
Peak
Log
10
dB/
W1 S2
S3 FS
AA
Center 2.472 GHz
Res BW 1 MHz
#VBW 1 MHz
Span 0 Hz
Sweep 4 ms (401 pts)
Freq/Channel
Center Freq
2.47162500 GHz
Start Freq
2.47162500 GHz
Stop Freq
2.47162500 GHz
CF Step
1.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

6. HOPPING CHANNEL SEPARATION MEASUREMENT

6.1 APPLIED PROCEDURES / LIMIT

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	100 kHz (Channel Separation)
VB	300 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

6.1.1 TEST PROCEDURE

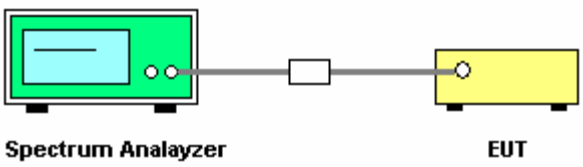
a. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.

b. The resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were utilised for channel separation measurement.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

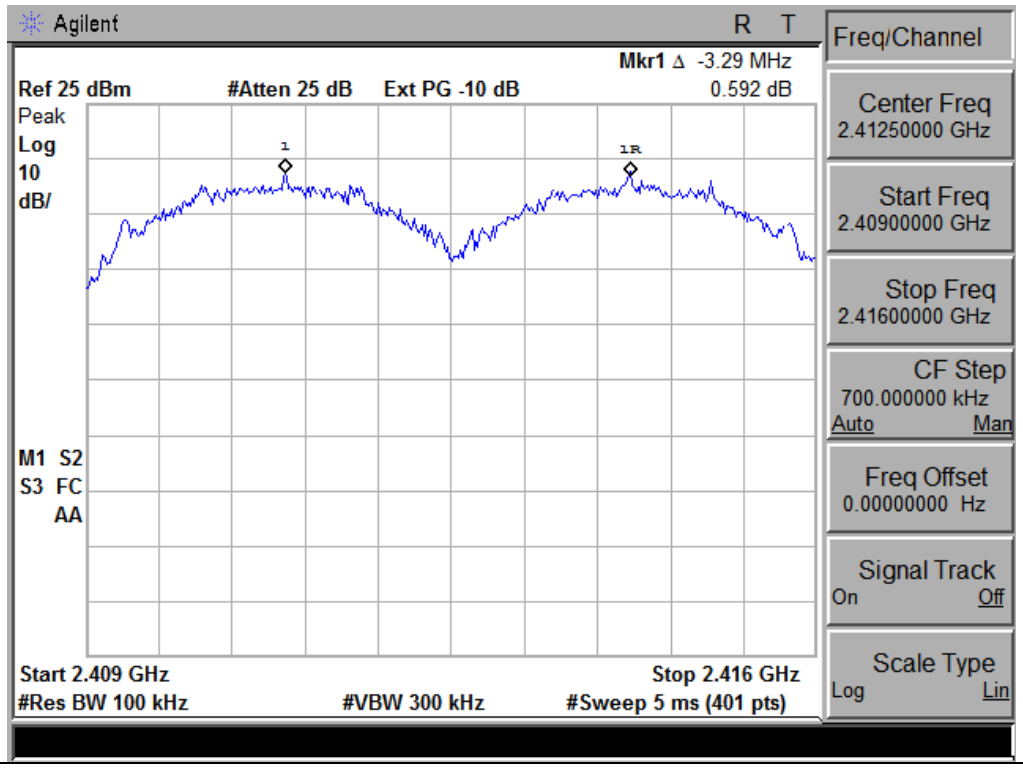
6.1.5 TEST RESULTS

EUT：	wireless camera	Model Name ：	830S
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 5.0V from adapter AC 120V/60Hz
Test Mode ：	CH00 / CH09 /CH18		

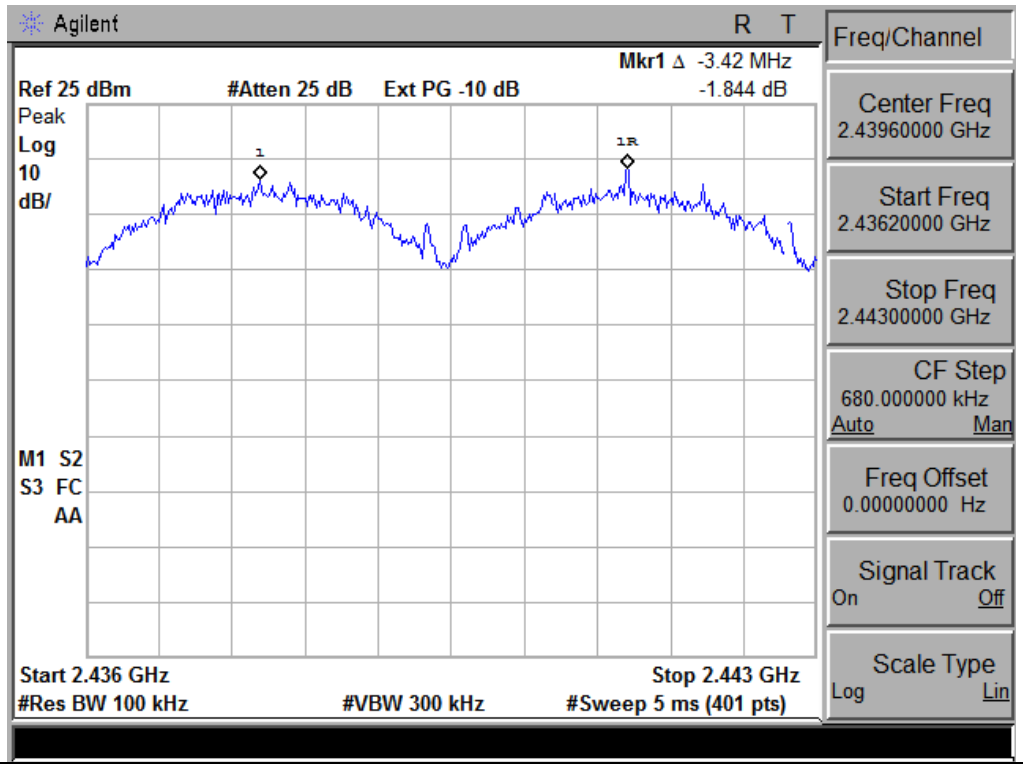
Frequency	Ch. Separation (MHz)	Result
2410.875 MHz	3.29	**Complies**
2441.250 MHz	3.42	**Complies**
2471.625 MHz	3.33	**Complies**

Ch. Separation Limits: >2/3 20dB bandwidth

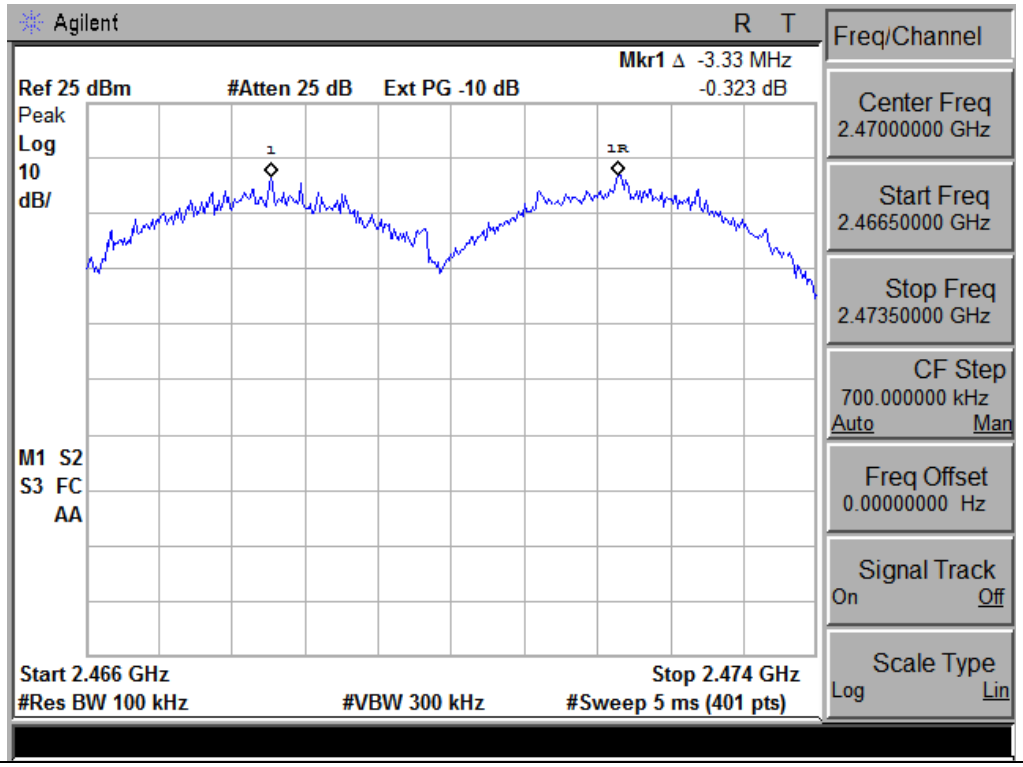
CH00



CH09


Agilent
R T
Mkr1 Δ -3.42 MHz
Ref 25 dBm
#Atten 25 dB
Ext PG -10 dB
-1.844 dB
Peak
Log
10
dB/
M1 S2
S3 FC
AA
Start 2.436 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.443 GHz
#Sweep 5 ms (401 pts)
Freq/Channel
Center Freq
2.43960000 GHz
Start Freq
2.43620000 GHz
Stop Freq
2.44300000 GHz
CF Step
680.000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

CH18


Agilent
R T
Mkr1 Δ -3.33 MHz
Ref 25 dBm
#Atten 25 dB
Ext PG -10 dB
-0.323 dB
Peak
Log
10
dB/
M1 S2
S3 FC
AA
Start 2.466 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.474 GHz
#Sweep 5 ms (401 pts)
Freq/Channel
Center Freq
2.47000000 GHz
Start Freq
2.46650000 GHz
Stop Freq
2.47350000 GHz
CF Step
700.000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

7. BANDWIDTH TEST

7.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)	Bandwidth	(20dB bandwidth)	2400-2483.5	PASS

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	100 kHz
VB	300 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

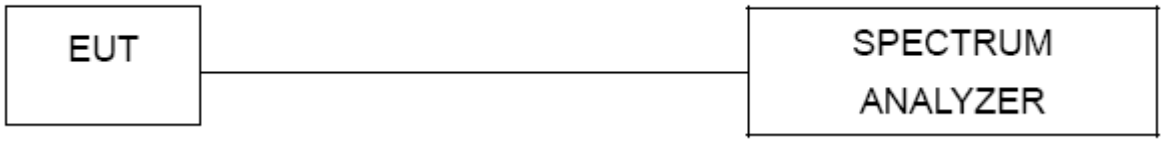
7.1.1 TEST PROCEDURE

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=300KHz, Sweep time = Auto.

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



7.1.4 EUT OPERATION CONDITIONS

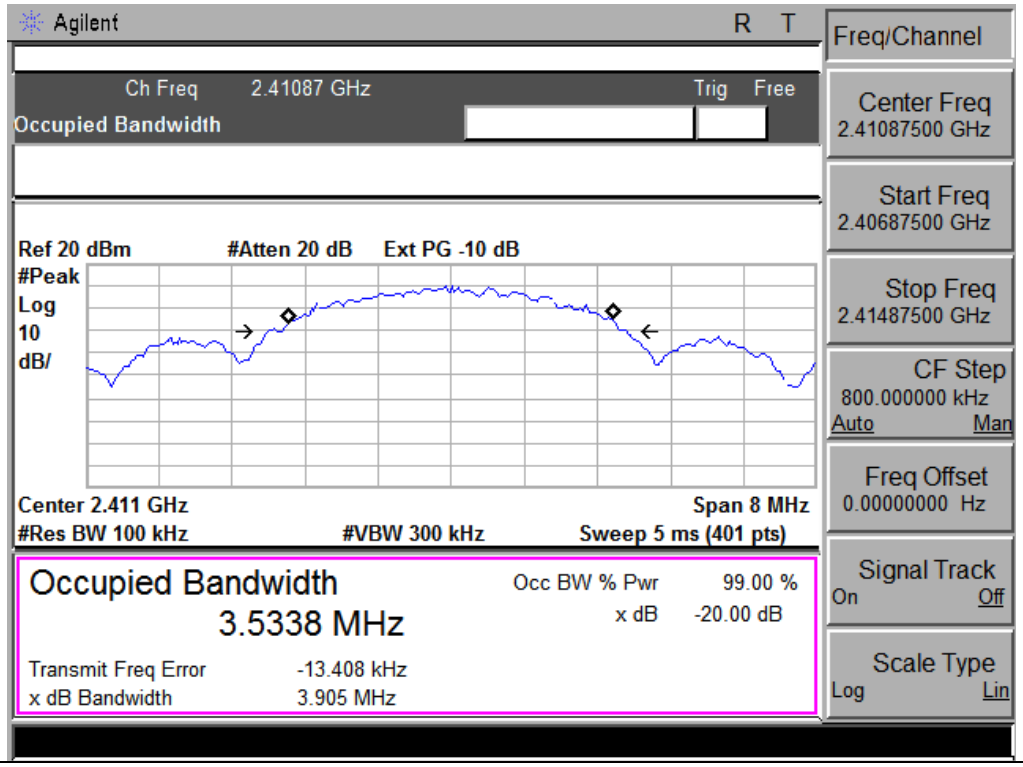
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

7.1.5 TEST RESULTS

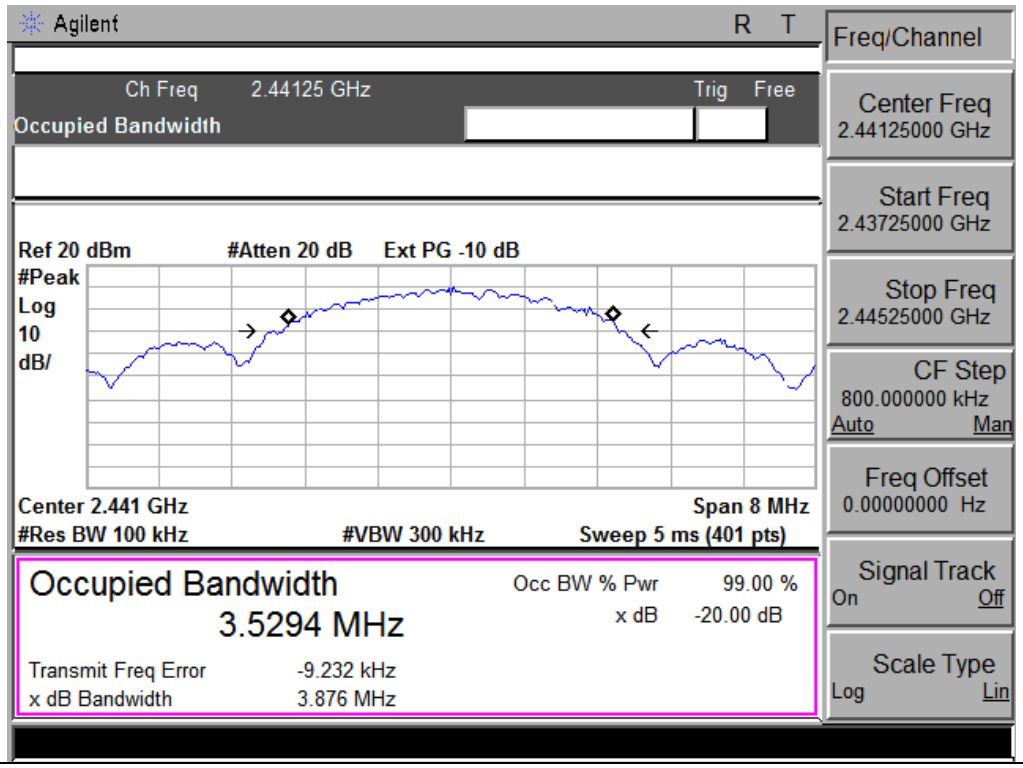
EUT：	wireless camera	Model Name ：	830S
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 5.0V from adapter AC 120V/60Hz
Test Mode ：	CH00 / CH09 /CH18		

Frequency	20dB Bandwidth (MHz)	Result
2410.875 MHz	3.905	**PASS**
2441.250 MHz	3.876	**PASS**
2471.625 MHz	3.640	**PASS**

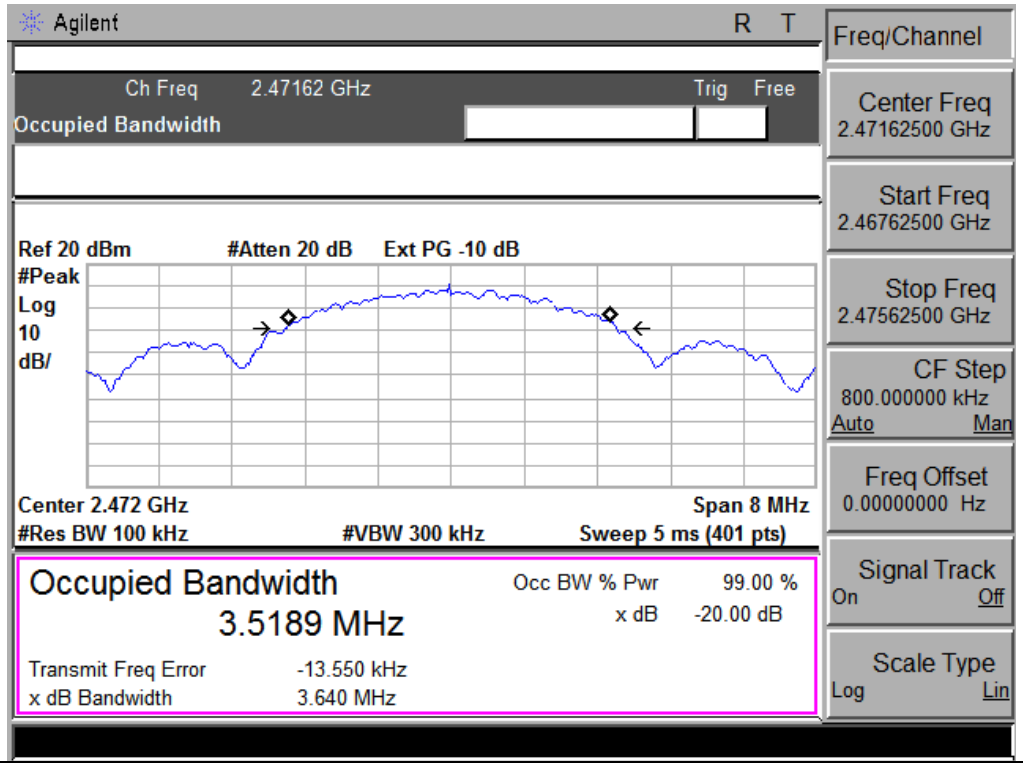
CH00



CH09


Agilent
R T
Ch Freq 2.44125 GHz
Trig Free
Occupied Bandwidth
Ref 20 dBm
#Atten 20 dB
Ext PG -10 dB
#Peak
Log
10
dB/
Center 2.441 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 8 MHz
Sweep 5 ms (401 pts)
Occupied Bandwidth
3.5294 MHz
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error -9.232 kHz
x dB Bandwidth 3.876 MHz
Freq/Channel
Center Freq
2.44125000 GHz
Start Freq
2.43725000 GHz
Stop Freq
2.44525000 GHz
CF Step
800.000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

CH18


Agilent
R T
Ch Freq 2.47162 GHz
Trig Free
Occupied Bandwidth
Ref 20 dBm
#Atten 20 dB
Ext PG -10 dB
#Peak
Log
10
dB/
Center 2.472 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 8 MHz
Sweep 5 ms (401 pts)
Occupied Bandwidth
3.5189 MHz
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error -13.550 kHz
x dB Bandwidth 3.640 MHz
Freq/Channel
Center Freq
2.47162500 GHz
Start Freq
2.46762500 GHz
Stop Freq
2.47562500 GHz
CF Step
800.000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

8. PEAK OUTPUT POWER TEST

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (b)(i)	Peak Output Power	0.125 w or 20.96dBm	2400-2483.5	PASS

8.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,

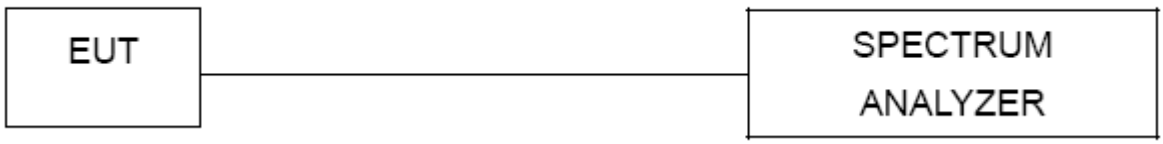
b. Spectrum Setting :

RBW =1MHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



8.1.4 EUT OPERATION CONDITIONS

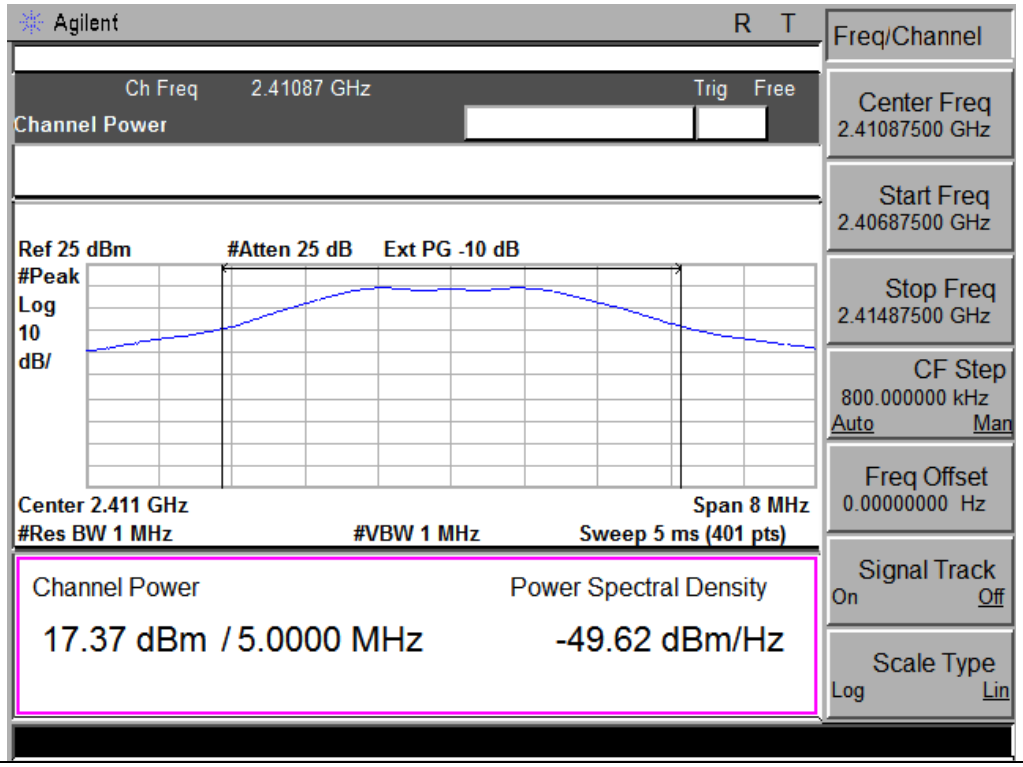
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

8.1.5 TEST RESULTS

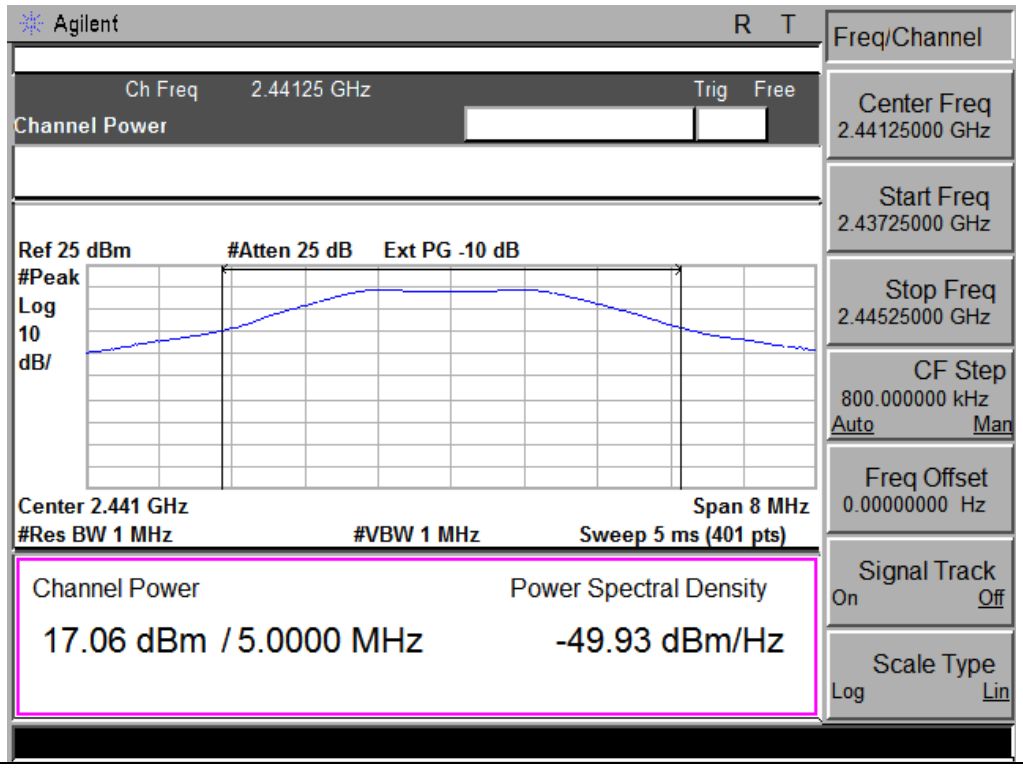
EUT：	wireless camera	Model Name ：	830S
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 5.0V from adapter AC 120V/60Hz
Test Mode ：	CH00/ CH09 /CH18		

Test Channel	Frequency (MHz)	Peak Output Power (dBm)	LIMIT (dBm)
CH00	2410.875	17.37	20.96
CH09	2441.250	17.06	20.96
CH18	2471.625	16.45	20.96

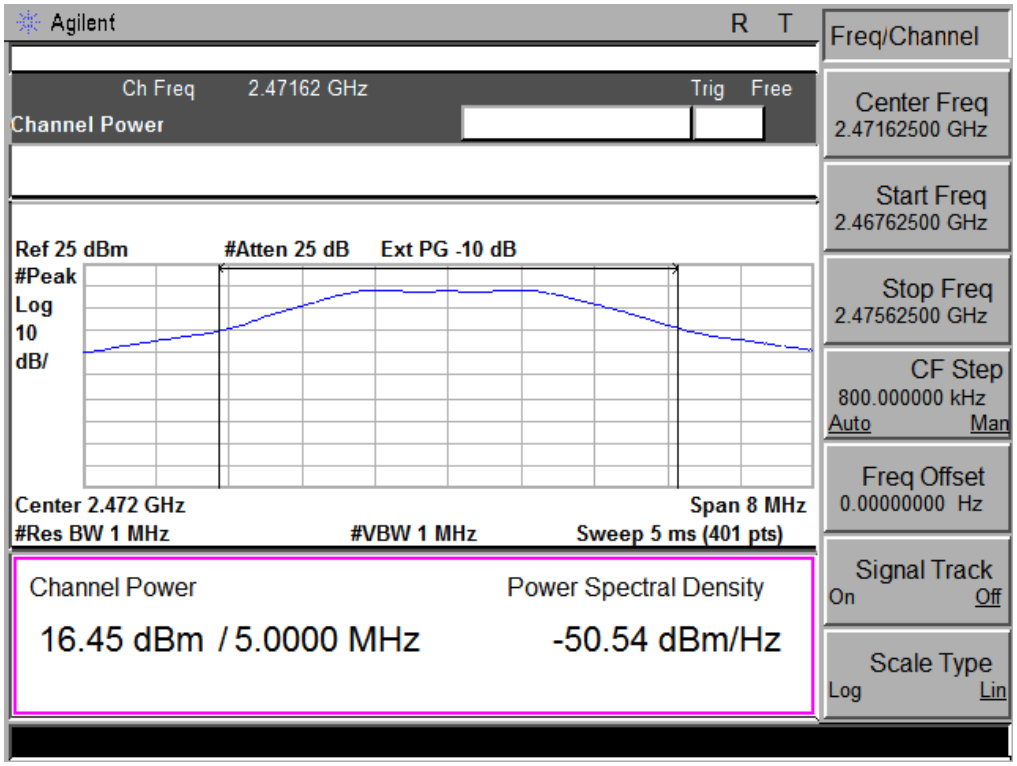
CH00



CH09


Agilent
R T
Ch Freq 2.44125 GHz
Trig Free
Channel Power
Ref 25 dBm
#Atten 25 dB
Ext PG -10 dB
#Peak
Log
10
dB/
Center 2.441 GHz
Span 8 MHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 5 ms (401 pts)
Channel Power
17.06 dBm / 5.0000 MHz
Power Spectral Density
-49.93 dBm/Hz
Freq/Channel
Center Freq
2.44125000 GHz
Start Freq
2.43725000 GHz
Stop Freq
2.44525000 GHz
CF Step
800.000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

CH18


Agilent
R T
Ch Freq 2.47162 GHz
Trig Free
Channel Power
Ref 25 dBm
#Atten 25 dB
Ext PG -10 dB
#Peak
Log
10
dB/
Center 2.472 GHz
Span 8 MHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 5 ms (401 pts)
Channel Power
16.45 dBm / 5.0000 MHz
Power Spectral Density
-50.54 dBm/Hz
Freq/Channel
Center Freq
2.47162500 GHz
Start Freq
2.46762500 GHz
Stop Freq
2.47562500 GHz
CF Step
800.000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

9. 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

a) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
b) 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.
c) 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.
d) 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.
e) Repeat above procedures until all measured frequencies were complete.

9.1 DEVIATION FROM STANDARD

No deviation.

9.2 TEST SETUP

9.3 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.

9.4 TEST RESULTS

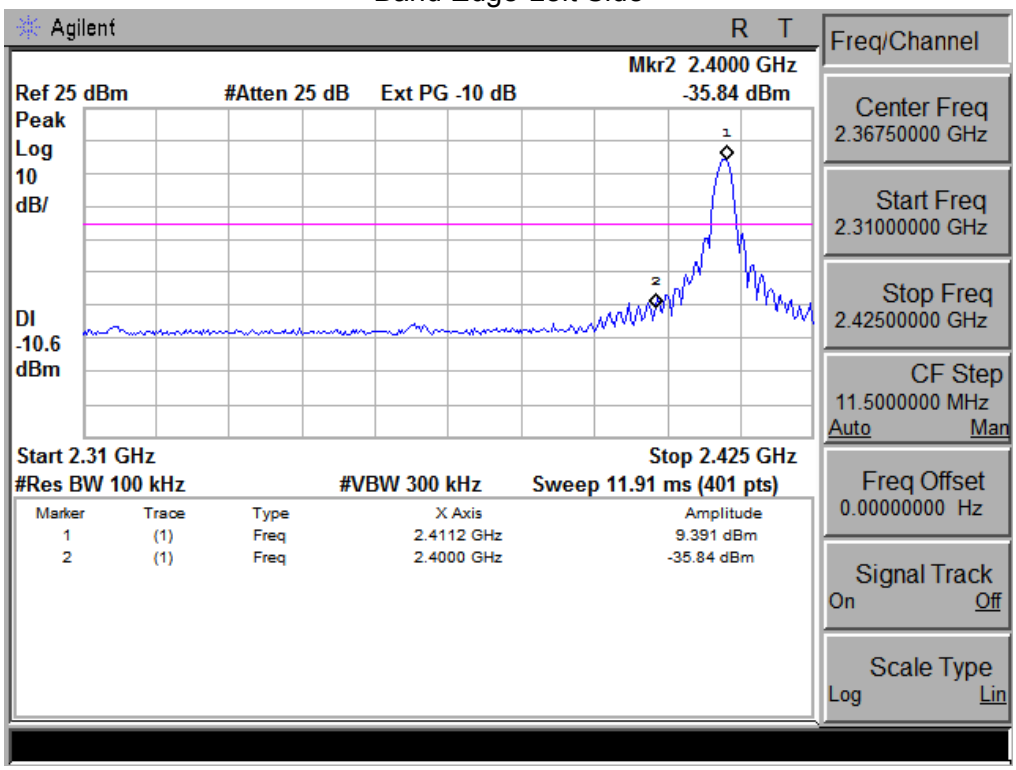
EUT：	wireless camera	Model Name ：	830S
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 5.0V from adapter AC 120V/60Hz
Test Mode ：	CH00/ CH18		

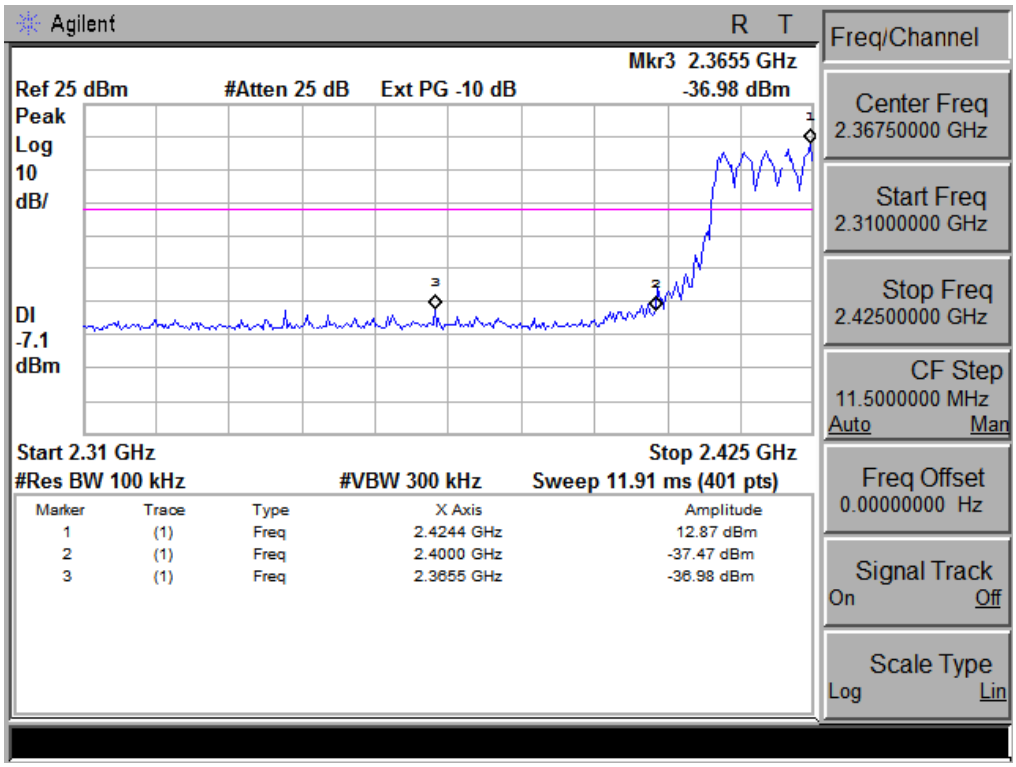
Frequency Band	Delta Peak to band emission (dBc)	＞Limit (dBc)	Result
Non-hopping			
Left-band	45.23	20	Pass
Right-band	45.58	20	Pass
hopping			
Left-band	50.34	20	Pass
Right-band	49.17	20	Pass

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type	Comment
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
2390	57.66	-13.06	44.60	74	-29.40	peak	Vertical
2390	56.58	-13.06	43.52	74	-30.48	peak	Horizontal
2483.5	57.42	-12.78	44.64	74	-29.36	peak	Vertical
2483.5	56.15	-12.78	43.37	74	-30.63	peak	Horizontal

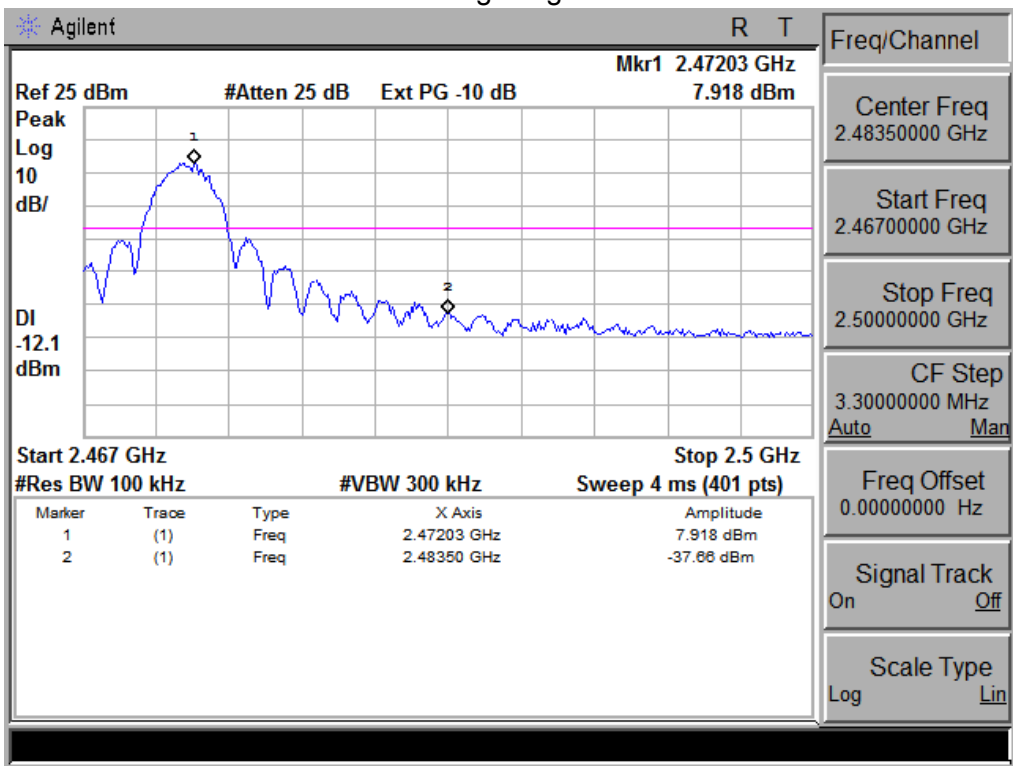
Note: Test method to see chapter 3.2 . When PK value is lower than the Average value limit, average didn't record.

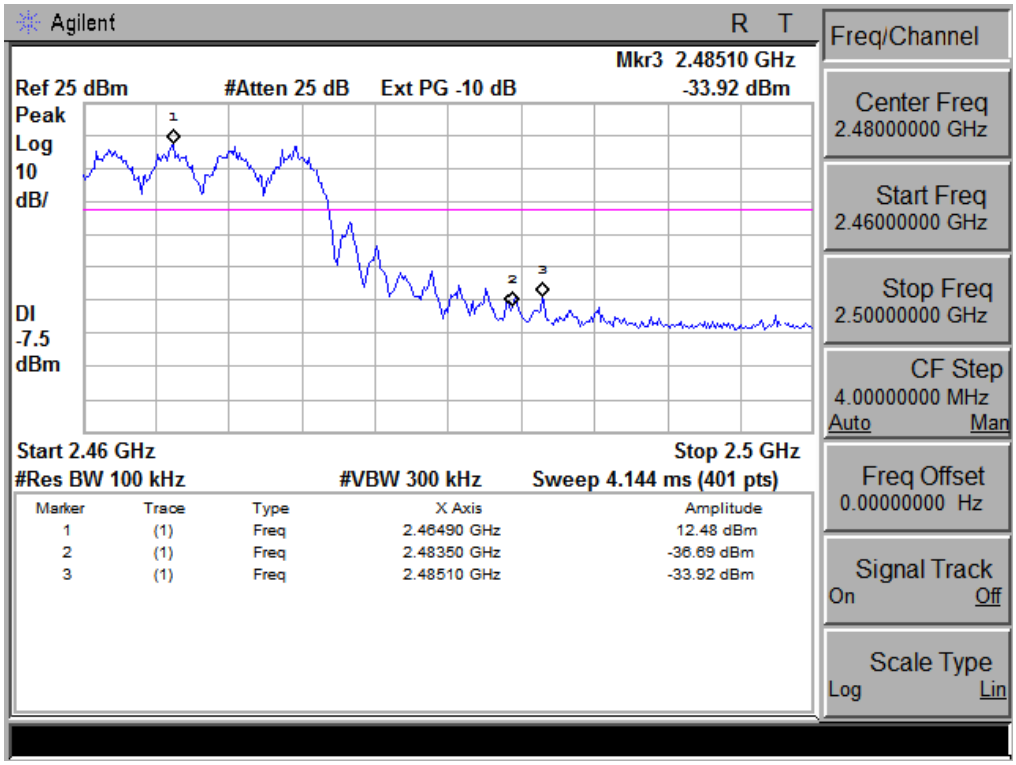
Band Edge-Left Side





Band Edge-Right Side





10. ANTENNA REQUIREMENT

10.1 STANDARD REQUIREMENT

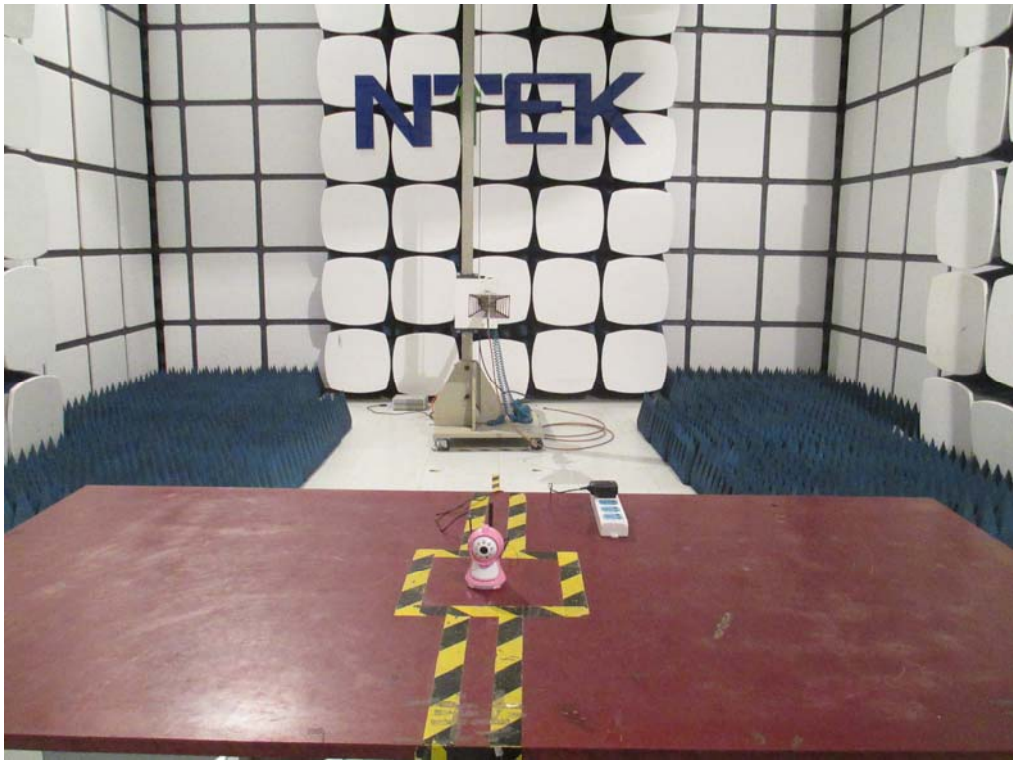
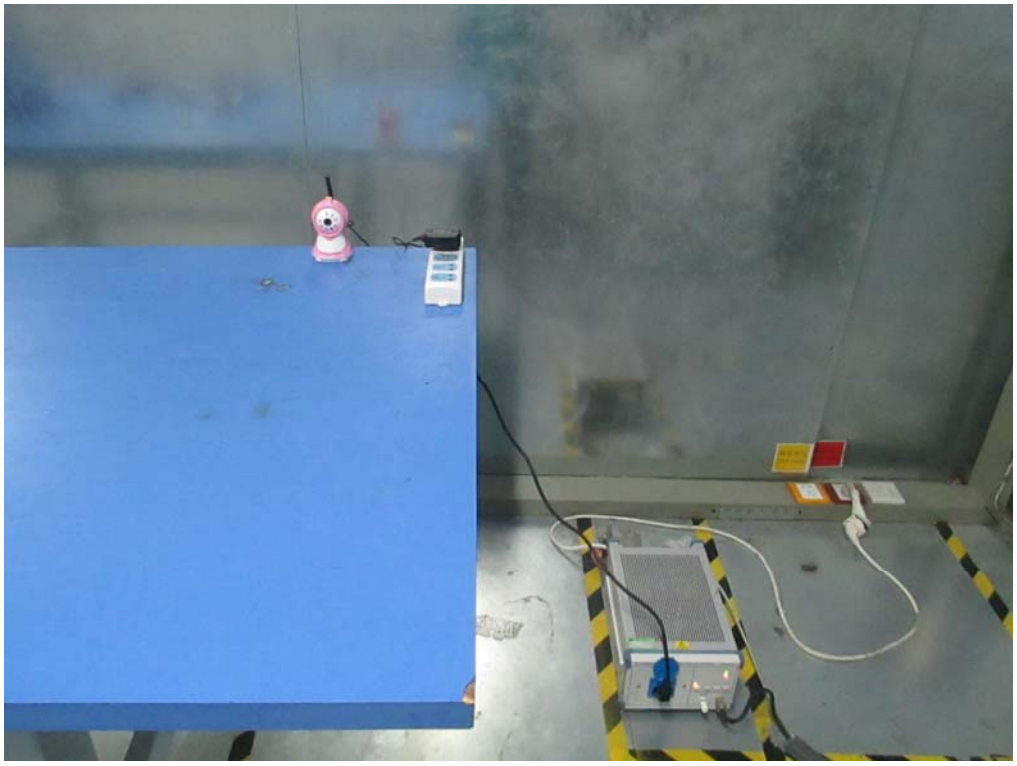
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

10.2 EUT ANTENNA

The EUT antenna is External Antenna. It comply with the standard requirement.

11. EUT TEST PHOTO

Radiated Measurement Photos



CONDUCTED EMISSION Photos