



FCC RADIO TEST REPORT

FCC ID: 2AB6C-890

Product : wireless camera

Trade Name : N/A

Model Name : 890

Serial Model : N/A

Report No. : NTEK-2014NT0307240F

Prepared for

Shenzhen Seepower Electronics Co., Ltd.
3 floor,9 Building,Guoxia industrial area ,Sanlian village,Longhua
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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 : 890
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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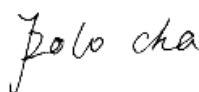
Date of Test :

Date (s) of performance of tests : 07 Mar. 2014 ~28 Mar. 2014

Date of Issue..... : 28 Mar. 2014

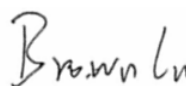
Test Result..... : **Pass**

Testing Engineer :



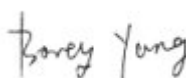
(Polo Cha)

Technical Manager :



(Brown Lu)

Authorized Signatory :



(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	29
5.1 APPLIED PROCEDURES / LIMIT	29

Table of Contents

	Page
5.1.1 TEST PROCEDURE	29
5.1.2 DEVIATION FROM STANDARD	29
5.1.3 TEST SETUP	30
5.1.4 EUT OPERATION CONDITIONS	30
5.1.5 TEST RESULTS	31
6 . HOPPING CHANNEL SEPARATION MEASUREMENT	32
6.1 APPLIED PROCEDURES / LIMIT	32
6.1.1 TEST PROCEDURE	32
6.1.2 DEVIATION FROM STANDARD	32
6.1.3 TEST SETUP	32
6.1.4 EUT OPERATION CONDITIONS	32
6.1.5 TEST RESULTS	33
7 . BANDWIDTH TEST	35
7.1 APPLIED PROCEDURES / LIMIT	35
7.1.1 TEST PROCEDURE	35
7.1.2 DEVIATION FROM STANDARD	35
7.1.3 TEST SETUP	35
7.1.4 EUT OPERATION CONDITIONS	35
7.1.5 TEST RESULTS	36
8 . PEAK OUTPUT POWER TEST	38
8.1 APPLIED PROCEDURES / LIMIT	38
8.1.1 TEST PROCEDURE	38
8.1.2 DEVIATION FROM STANDARD	38
8.1.3 TEST SETUP	38
8.1.4 EUT OPERATION CONDITIONS	38
8.1.5 TEST RESULTS	39
9 . 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE	41
9.1 DEVIATION FROM STANDARD	41
9.2 TEST SETUP	41
9.3 EUT OPERATION CONDITIONS	41
9.4 TEST RESULTS	42
10 . ANTENNA REQUIREMENT	45
10.1 STANDARD REQUIREMENT	45
10.2 EUT ANTENNA	45
11 . EUT TEST PHOTO	46
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 $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

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

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	wireless camera	
Trade Name	N/A	
Model Name	890	
Serial Model	N/A	
Model Difference	N/A	
Product Description	The EUT is a wireless camera	
	Operation Frequency:	2408.625~2473.875 MHz
	Modulation Type:	GFSK
	Bit Rate of Transmitter	1Mbps
	Number Of Channel	24 CH
	Antenna Designation:	Please see Note 3.
	Output Power(Conducted):	19.23dBm(Max)
	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, 0.2Amax	
	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	2408.625	09	2434.500	18	2459.250
01	2412.000	10	2436.750	19	2461.500
02	2415.250	11	2439.000	20	2464.875
03	2417.625	12	2442.625	21	2467.125
04	2422.125	13	2445.250	22	2470.500
05	2425.500	14	2448.000	23	2473.875
06	2427.750	15	2450.250		
07	2430.000	16	2453.625		
08	2432.250	17	2457.000		

3.

Table for Filed Antenna

Ant .	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	N/A	N/A	External	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	CH12
Mode 3	CH23
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	CH12
Mode 3	CH23

Note:

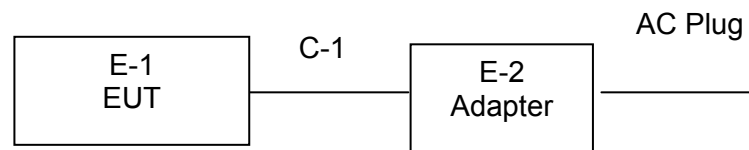
- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) The EUT use new battery.

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	2408.625MHz	2442.625 MHz	2473.875 MHz
Parameters(1Mbps)	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	890	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

- 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 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.

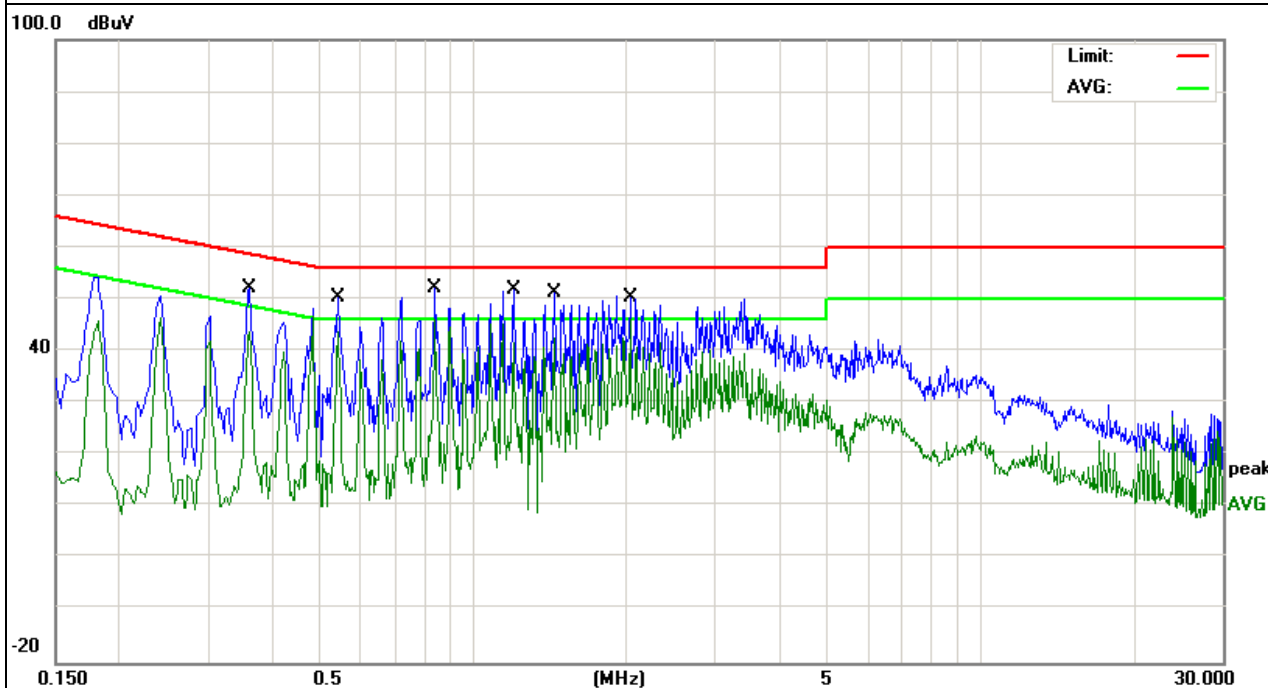
3.1.6 TEST RESULTS

EUT :	wireless camera	Model Name :	890
Temperature :	26 °C	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)	
0.3620	42.64	9.50	52.14	58.68	-6.54	QP
0.3620	34.39	9.50	43.89	48.68	-4.79	AVG
0.5420	40.92	9.51	50.43	56.00	-5.57	QP
0.5420	32.20	9.51	41.71	46.00	-4.29	AVG
0.8420	42.52	9.53	52.05	56.00	-3.95	QP
0.8420	32.13	9.53	41.66	46.00	-4.34	AVG
1.1980	42.42	9.53	51.95	56.00	-4.05	QP
1.1980	32.18	9.53	41.71	46.00	-4.29	AVG
1.4420	41.81	9.54	51.35	56.00	-4.65	QP
1.4420	32.94	9.54	42.48	46.00	-3.52	AVG
2.0420	40.92	9.55	50.47	56.00	-5.53	QP
2.0420	32.64	9.55	42.19	46.00	-3.81	AVG

Remark:

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

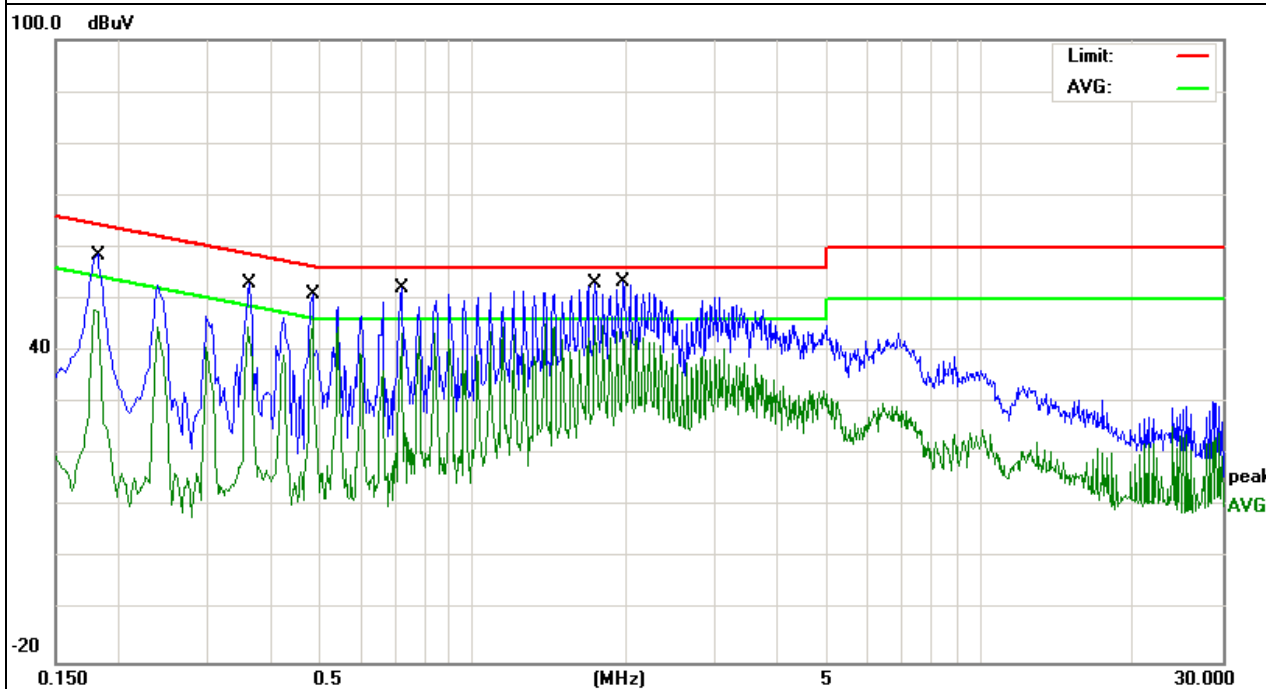


EUT :	wireless camera	Model Name :	890
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	DC 5.0V from adapter AC 120V/60Hz	Test Mode :	Mode 4

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1780	49.13	9.55	58.68	64.57	-5.89	QP
0.1780	38.50	9.55	48.05	54.57	-6.52	AVG
0.3580	43.42	9.50	52.92	58.77	-5.85	QP
0.3580	35.12	9.50	44.62	48.77	-4.15	AVG
0.4820	41.47	9.51	50.98	56.30	-5.32	QP
0.4820	33.73	9.51	43.24	46.30	-3.06	AVG
0.7220	42.54	9.53	52.07	56.00	-3.93	QP
0.7220	32.96	9.53	42.49	46.00	-3.51	AVG
1.7420	43.15	9.54	52.69	56.00	-3.31	QP
1.7420	33.33	9.54	42.87	46.00	-3.13	AVG
1.9780	42.87	9.55	52.42	56.00	-3.58	QP
1.9780	30.59	9.55	40.14	46.00	-5.86	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	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. For frequencies above 1GHz, any suitable measuring distance may be used.
- 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.
- 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.
- 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.
- 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:

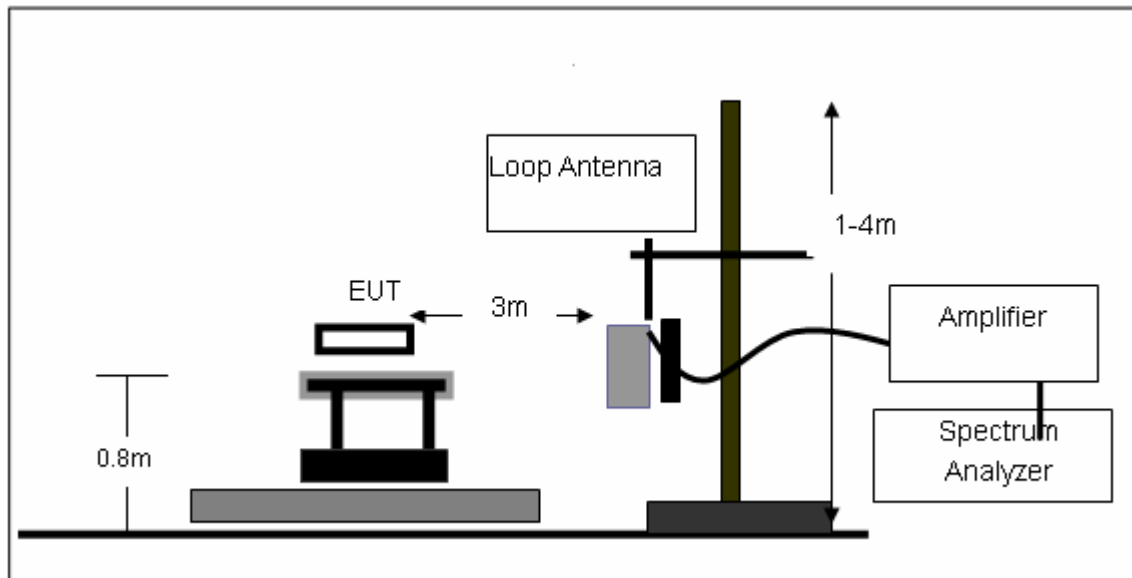
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

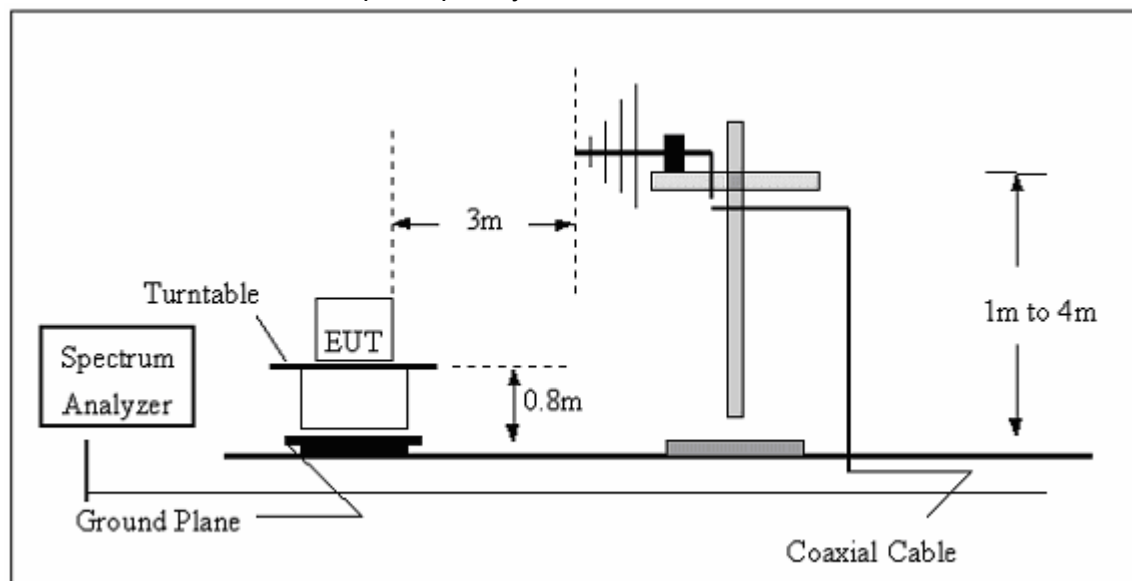
No deviation

3.2.4 TEST SETUP

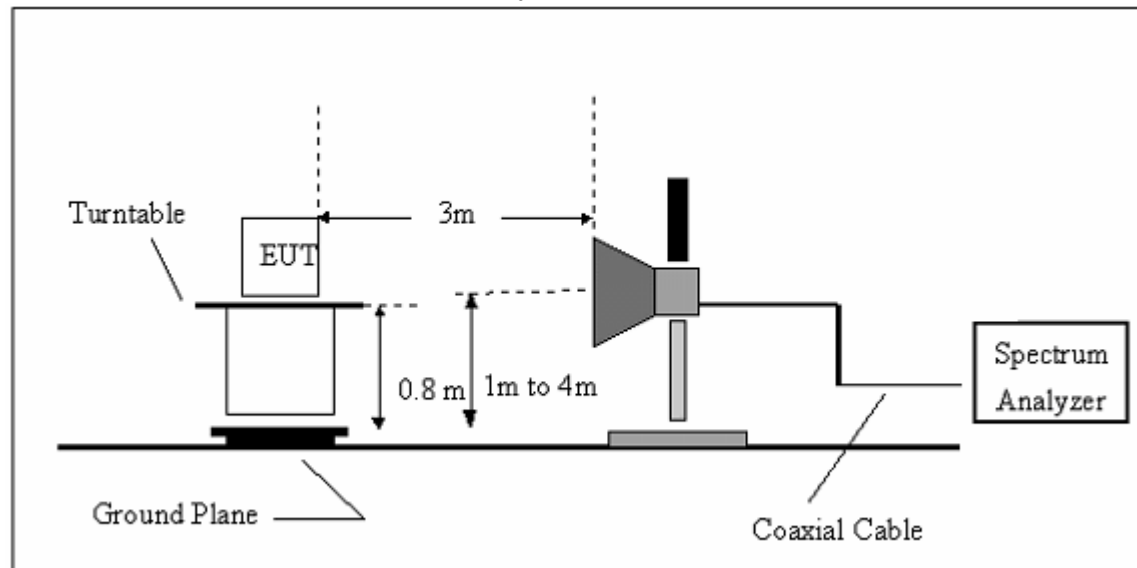
(A) Radiated Emission Test-Up Frequency Below 30MHz



(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 (BELOW 30 MHZ)

EUT :	wireless camera	Model Name :	890
Temperature :	20 °C	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 = $20 \log (\text{specific distance}/\text{test distance})(\text{dB})$;

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

3.2.7 TEST RESULTS (BETWEEN 30M – 1000 MHZ)

EUT :	wireless camera	Model Name :	890
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Test Mode :	TX
Test Voltage :	DC 5.0V from adapter AC 120V/60Hz		

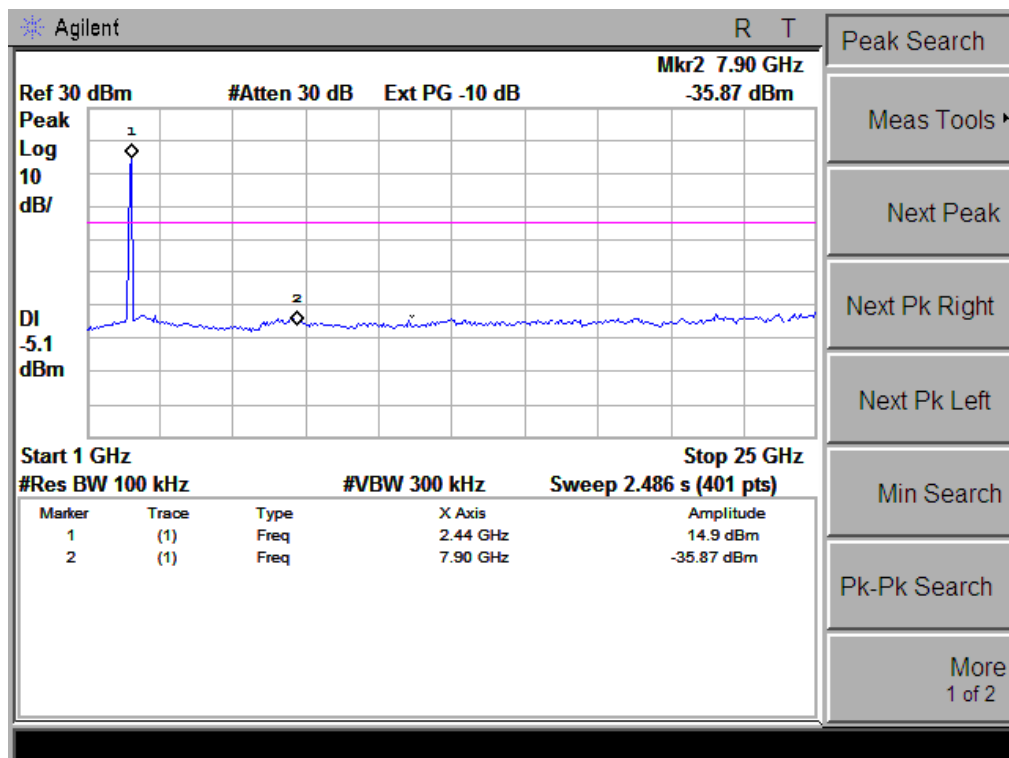
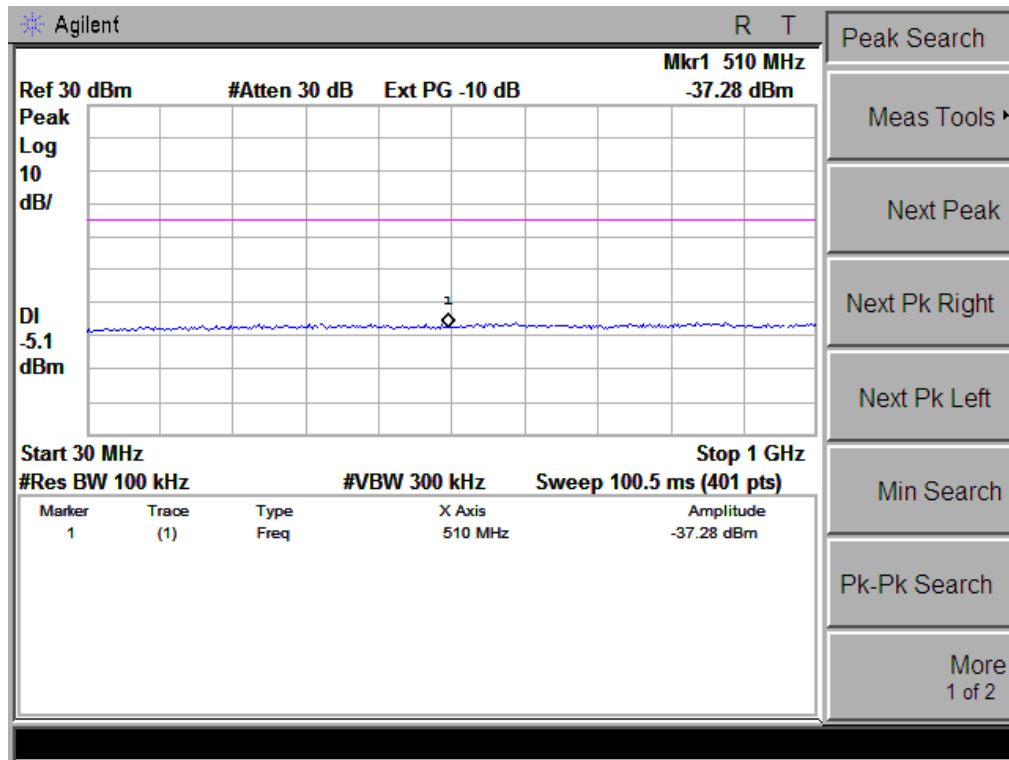
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detect or Type	Comment
Below 1G							
119.8555	24.08	12.09	36.17	43.50	-7.33	QP	Vertical
143.8293	25.50	12.06	37.56	43.50	-5.94	QP	Vertical
263.8190	24.64	14.62	39.26	46.00	-6.74	QP	Vertical
287.9904	26.41	14.30	40.71	46.00	-5.29	QP	Vertical
336.0350	20.89	16.03	36.92	46.00	-9.08	QP	Vertical
768.7481	14.53	26.20	40.73	46.00	-5.27	QP	Vertical
263.8190	22.89	14.62	37.51	46.00	-8.49	QP	Horizontal
287.9904	25.76	14.30	40.06	46.00	-5.94	QP	Horizontal
336.0350	26.01	16.03	42.04	46.00	-3.96	QP	Horizontal
360.4476	22.65	16.46	39.11	46.00	-6.89	QP	Horizontal
382.5878	24.90	17.30	42.20	46.00	-3.80	QP	Horizontal
576.6443	16.19	22.44	38.63	46.00	-7.37	QP	Horizontal

EUT :	wireless camera	Model Name :	890
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Test Mode :	TX
Test Voltage :	DC 5.0V from adapter AC 120V/60Hz		

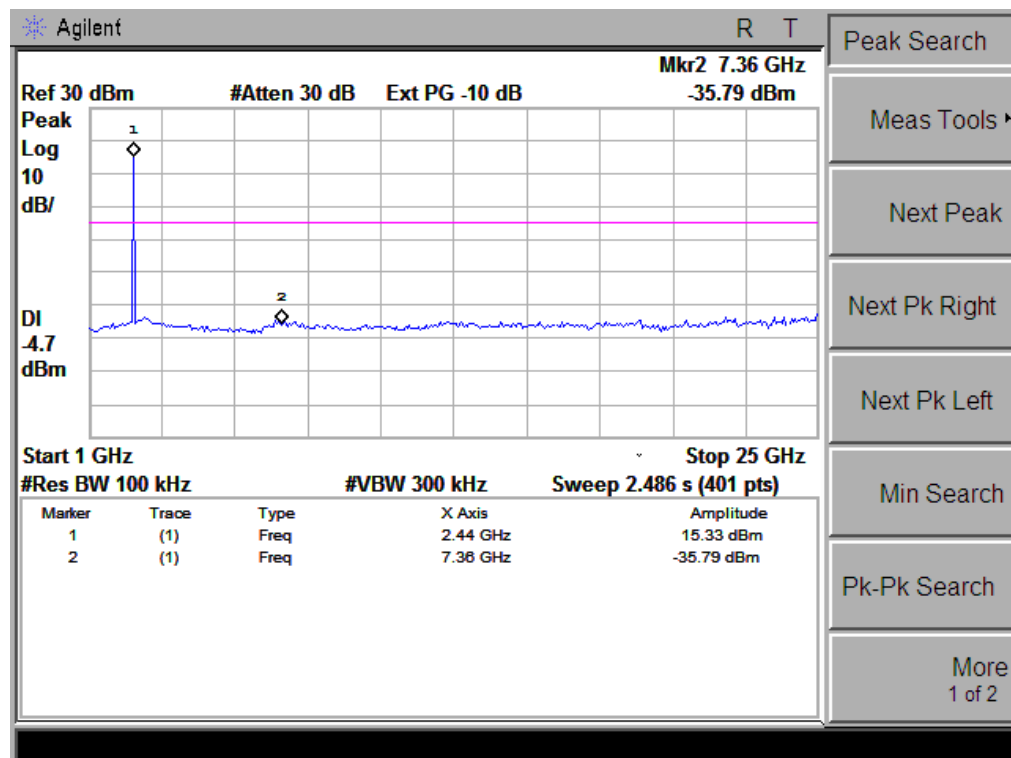
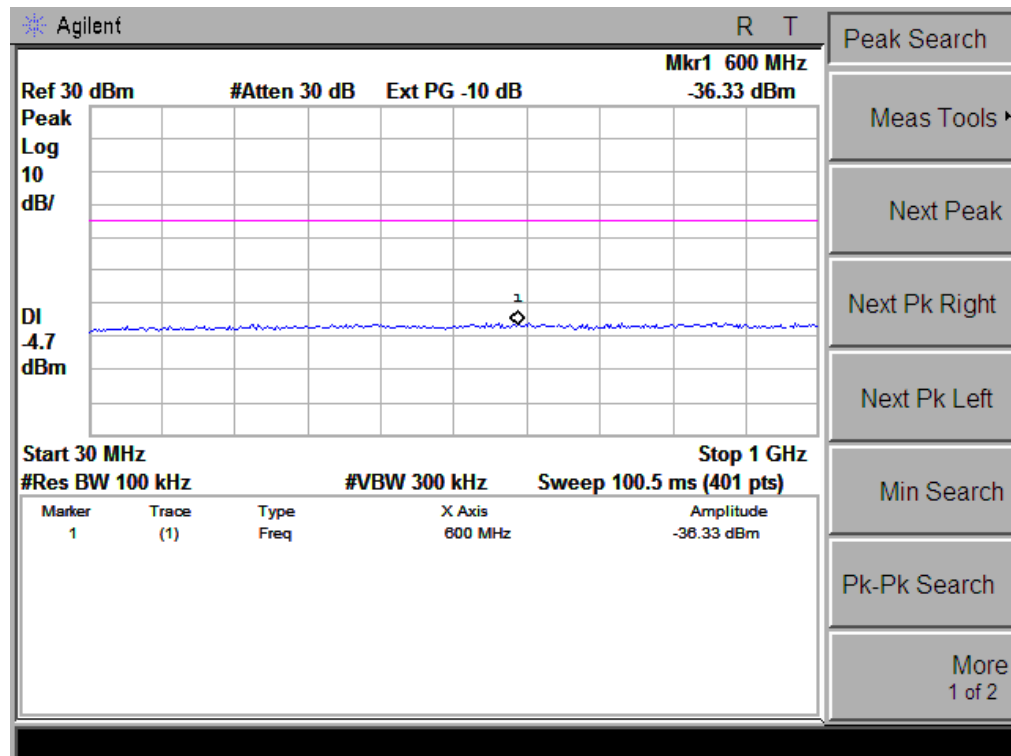
Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Frequency:2408.625MHz							
V	4821.358	51.62	-3.64	47.98	74.00	-26.02	peak
V	7232.255	47.38	-0.95	46.43	74.00	-27.57	peak
H	4822.363	51.22	-3.64	47.58	74.00	-26.42	peak
H	7230.570	46.75	-0.95	45.80	74.00	-28.20	peak
Frequency:2442.625MHz							
V	4883.596	50.44	-3.67	46.77	74.00	-27.23	peak
V	7325.082	46.12	-0.82	45.30	74.00	-28.70	peak
H	4884.359	50.35	-3.67	46.68	74.00	-27.32	peak
H	7325.344	47.84	-0.82	47.02	74.00	-26.98	peak
Frequency:2473.875MHz							
V	4945.961	52.97	-3.59	49.38	74.00	-24.62	peak
V	7410.654	51.45	-0.68	50.77	74.00	-23.23	peak
H	4946.920	54.00	-3.59	50.41	74.00	-23.59	peak
H	7413.185	49.30	-0.68	48.62	74.00	-25.38	peak
Remark:							
Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit							

Conducted Spurious Emissions at Antenna Port:

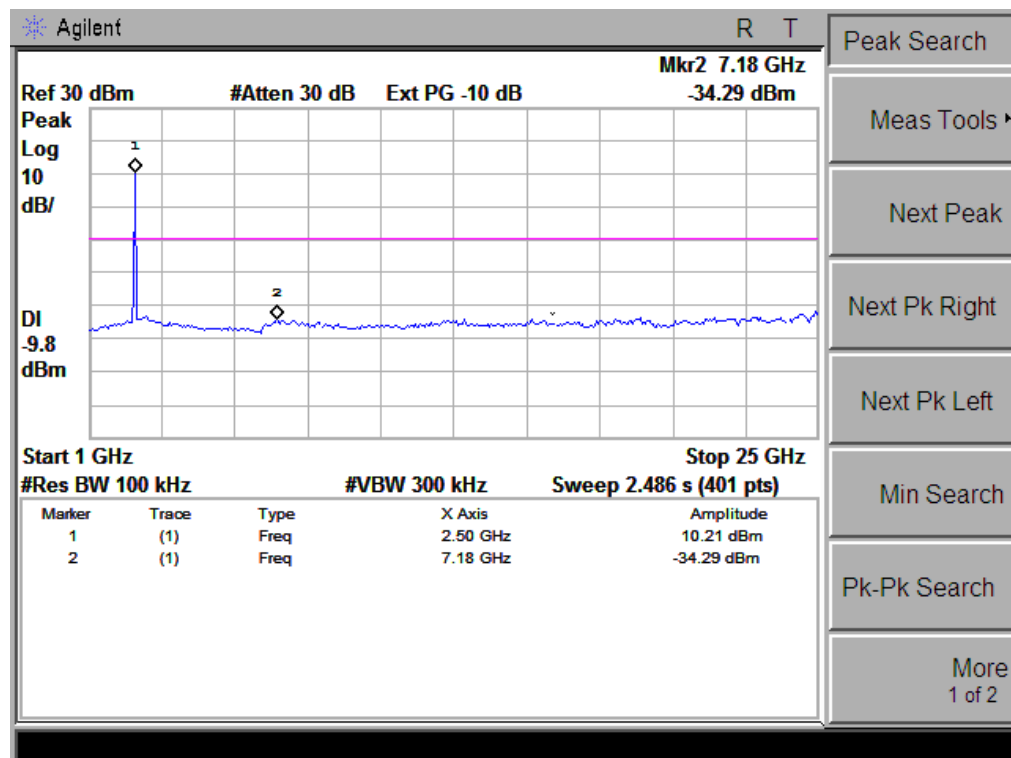
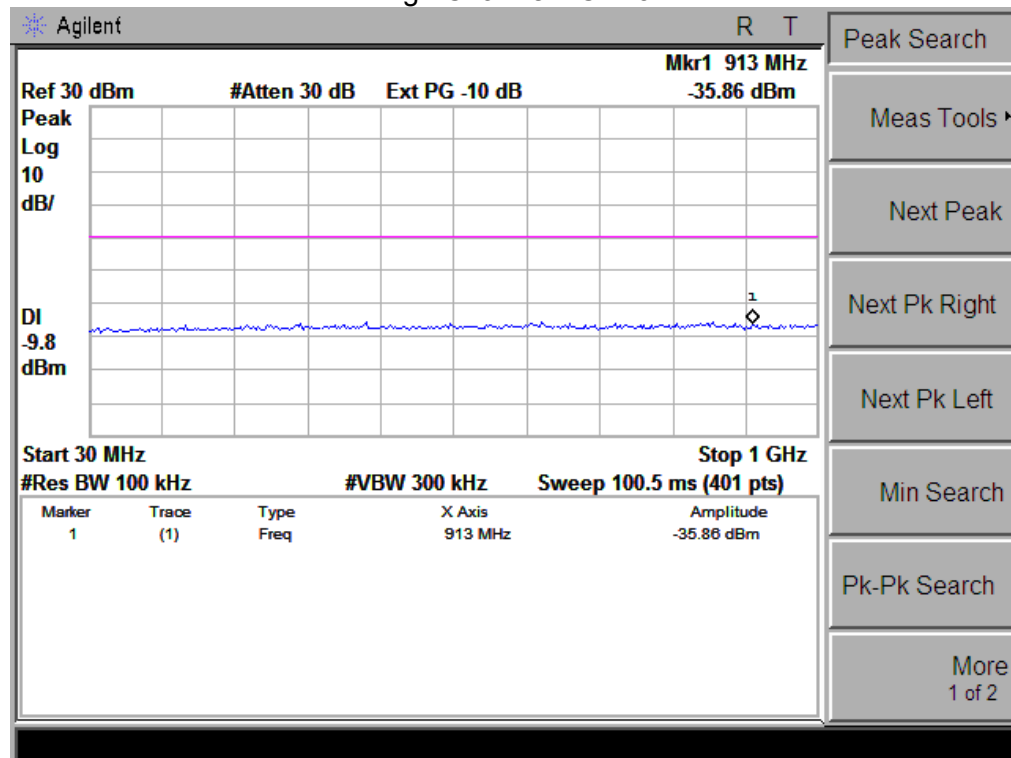
Low Channel –CH00



Middle Channel –CH12



High Channel –CH23



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=100kHz
VB	VBW $\geq$ RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 100kHz, VBW=100kHz, Sweep time = Auto.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



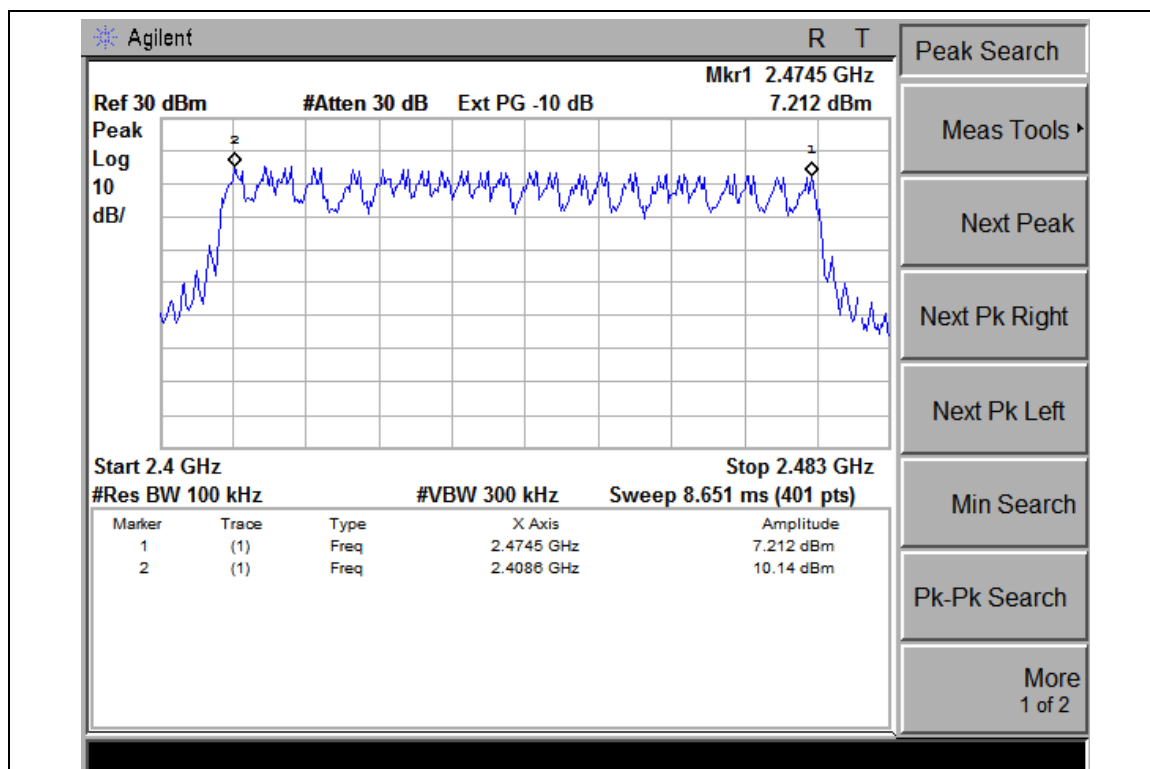
4.1.4 EUT OPERATION CONDITIONS

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 :	890
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	DC 5.0V from adapter AC 120V/60Hz
Test Mode :	Hopping Mode		

Number of Hopping Channel	24
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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 * (150/2)*9.6/(channel number)

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



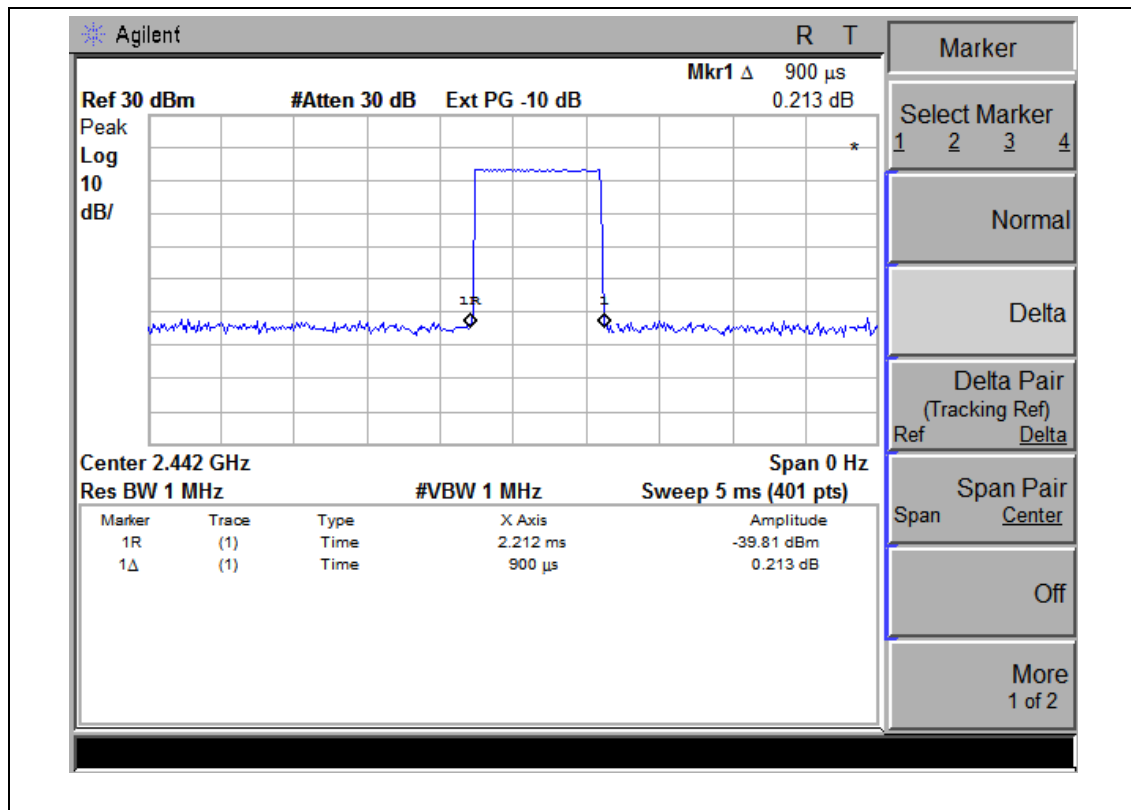
5.1.4 EUT OPERATION CONDITIONS

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 :	890
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 5.0V from adapter AC 120V/60Hz
Test Mode :	CH12		

Frequency	Pulse Duration	Dwell Time	Limits
	(ms)	(s)	(s)
2442MHz	0.9	0.027	0.4



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

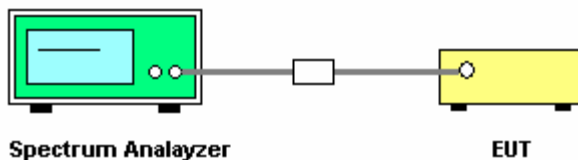
6.1.1 TEST PROCEDURE

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

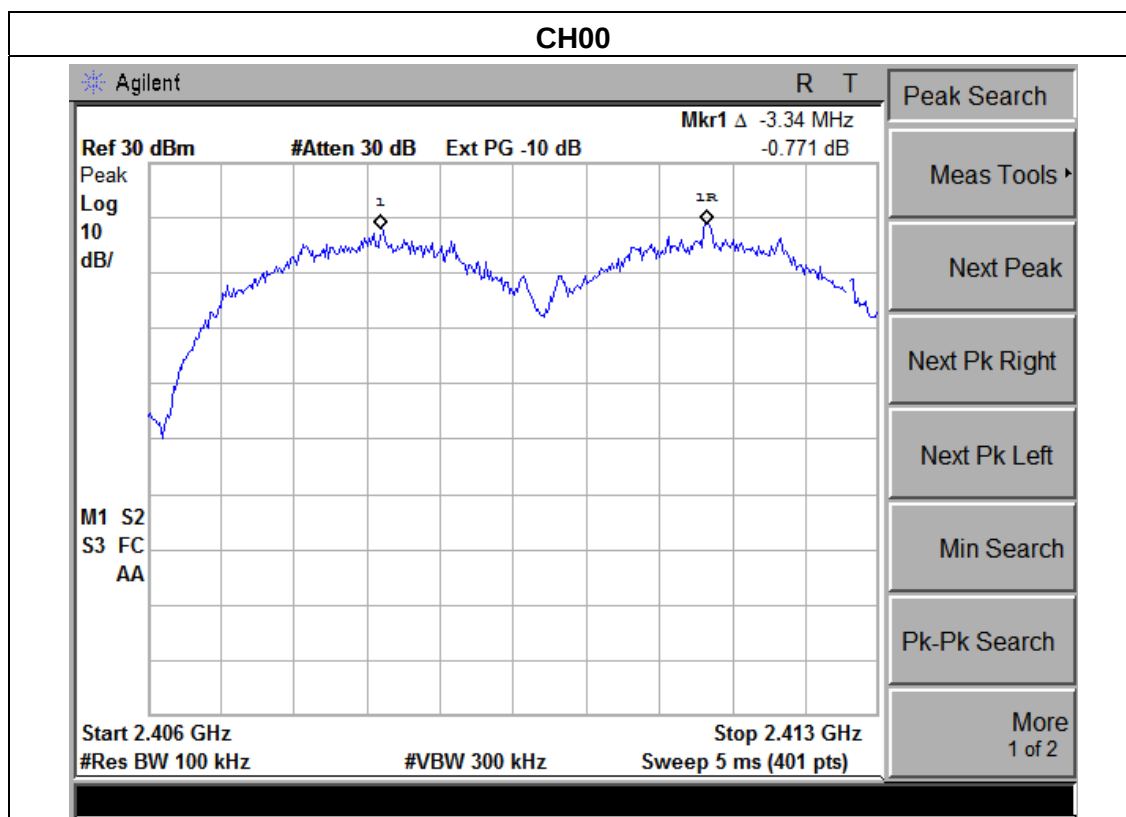
The EUT was programmed to be in continuously transmitting mode.

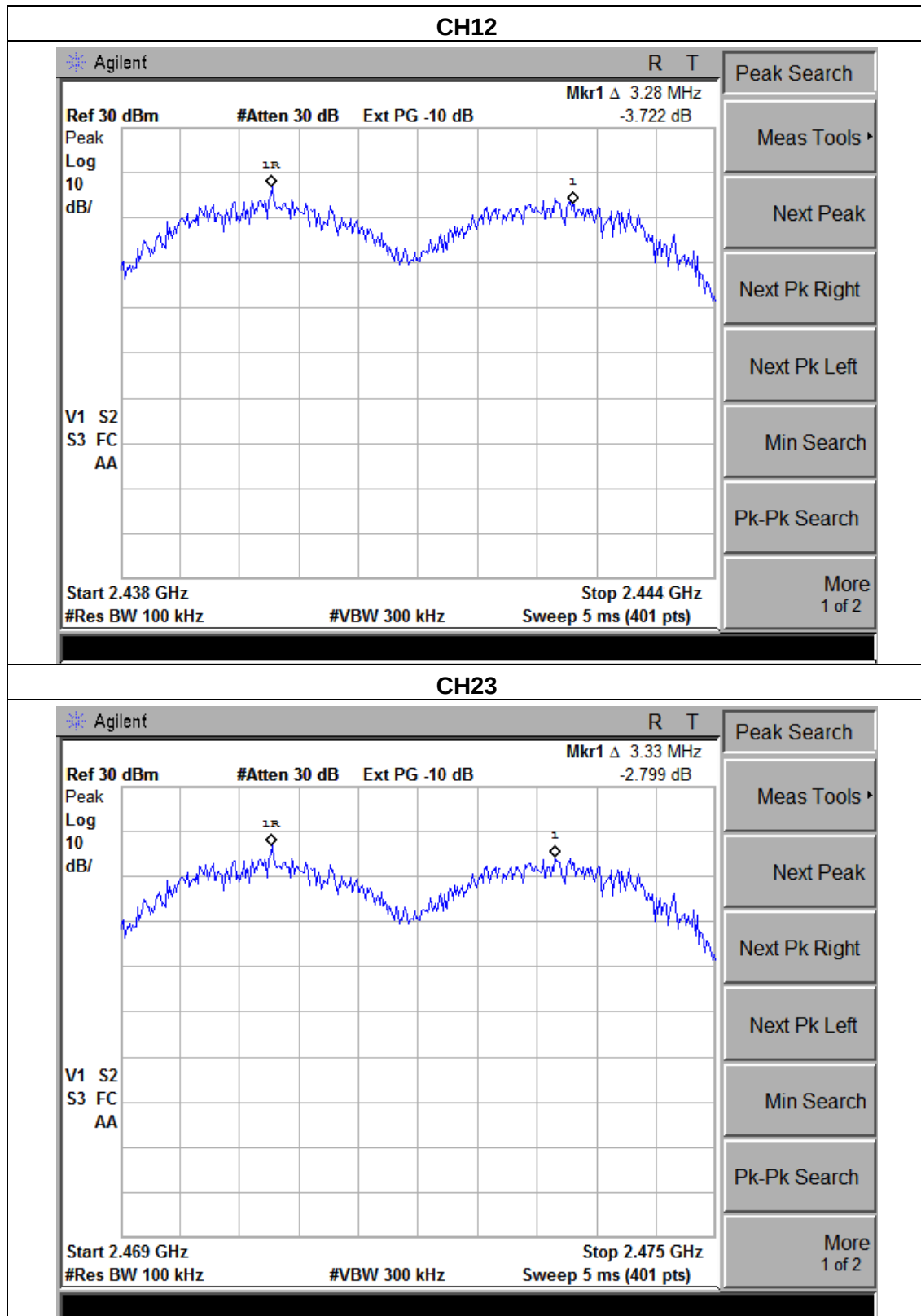
6.1.5 TEST RESULTS

EUT :	wireless camera	Model Name :	890
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 5.0V from adapter AC 120V/60Hz
Test Mode :	CH00 / CH12 /CH 23		

Frequency	Ch. Separation (MHz)	Result
2408.625 MHz	3.34	Complies
2442.625 MHz	3.28	Complies
2473.875MHz	3.33	Complies

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





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

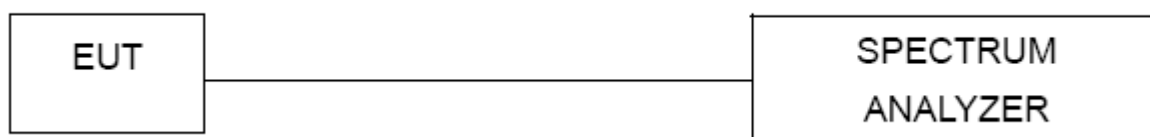
7.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 100KHz, VBW=300KHz, Sweep time = Auto.

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



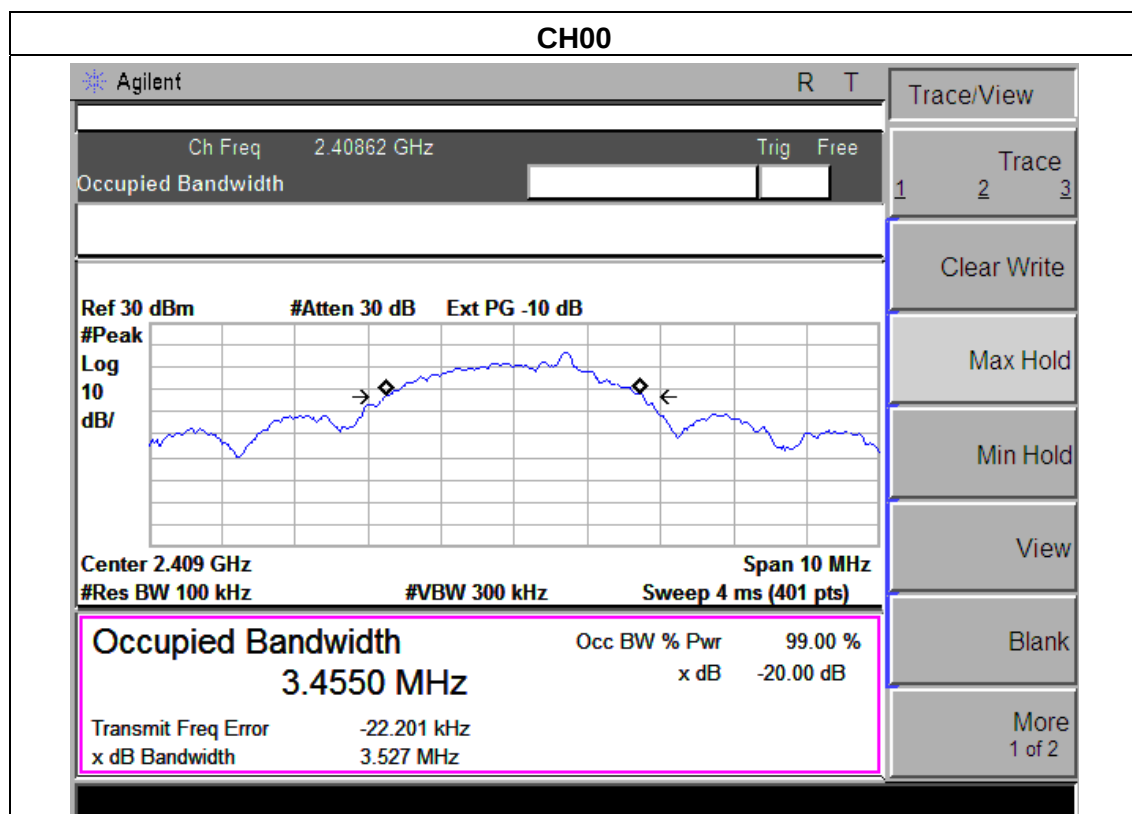
7.1.4 EUT OPERATION CONDITIONS

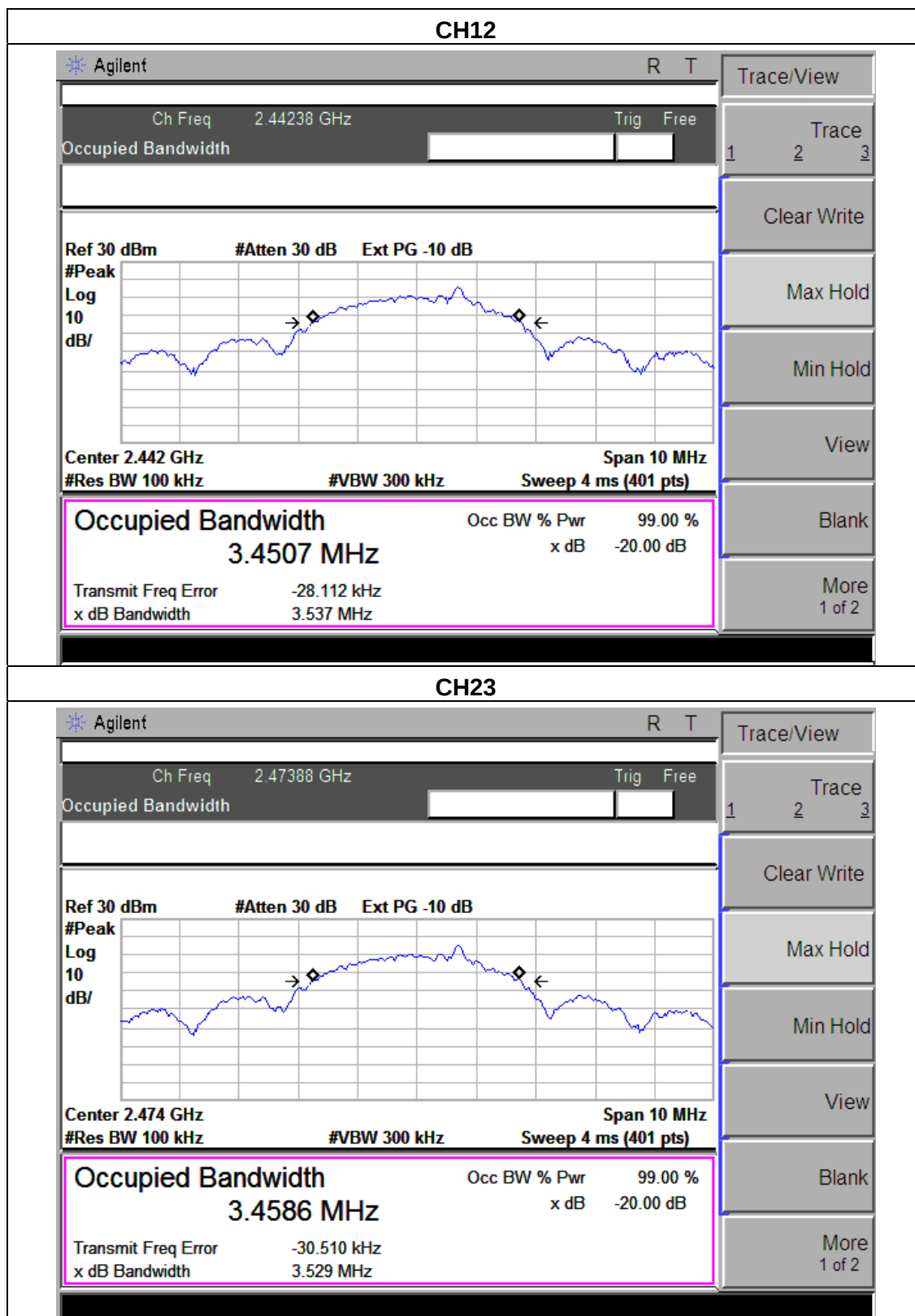
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

7.1.5 TEST RESULTS

EUT :	wireless camera	Model Name :	890
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 5.0V from adapter AC 120V/60Hz
Test Mode :	CH00 / CH12 /CH23		

Frequency	20dB Bandwidth (MHz)	Result
2408.625 MHz	3.527	PASS
2442.625 MHz	3.537	PASS
2473.875MHz	3.529	PASS





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 :
 - Span = approximately 3 times the 20 dB bandwidth, centered on a hopping channel
 - RBW =1MHz
 - VBW $\geq$ 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

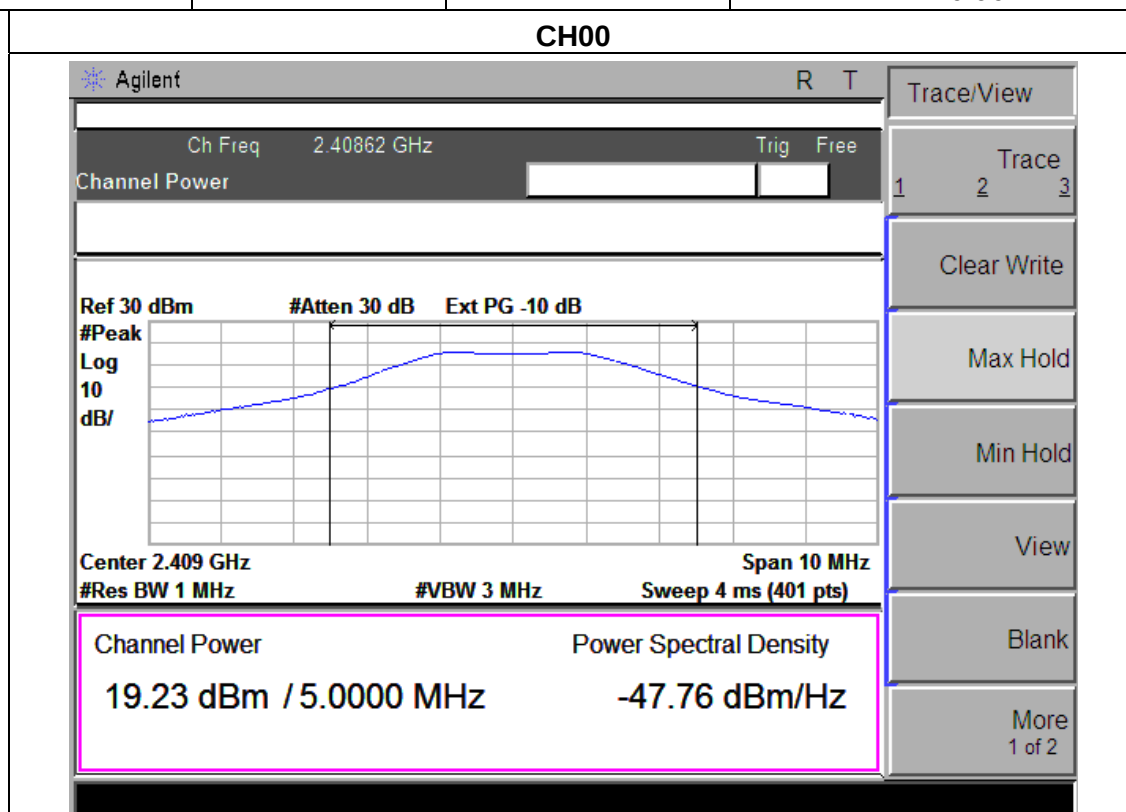
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

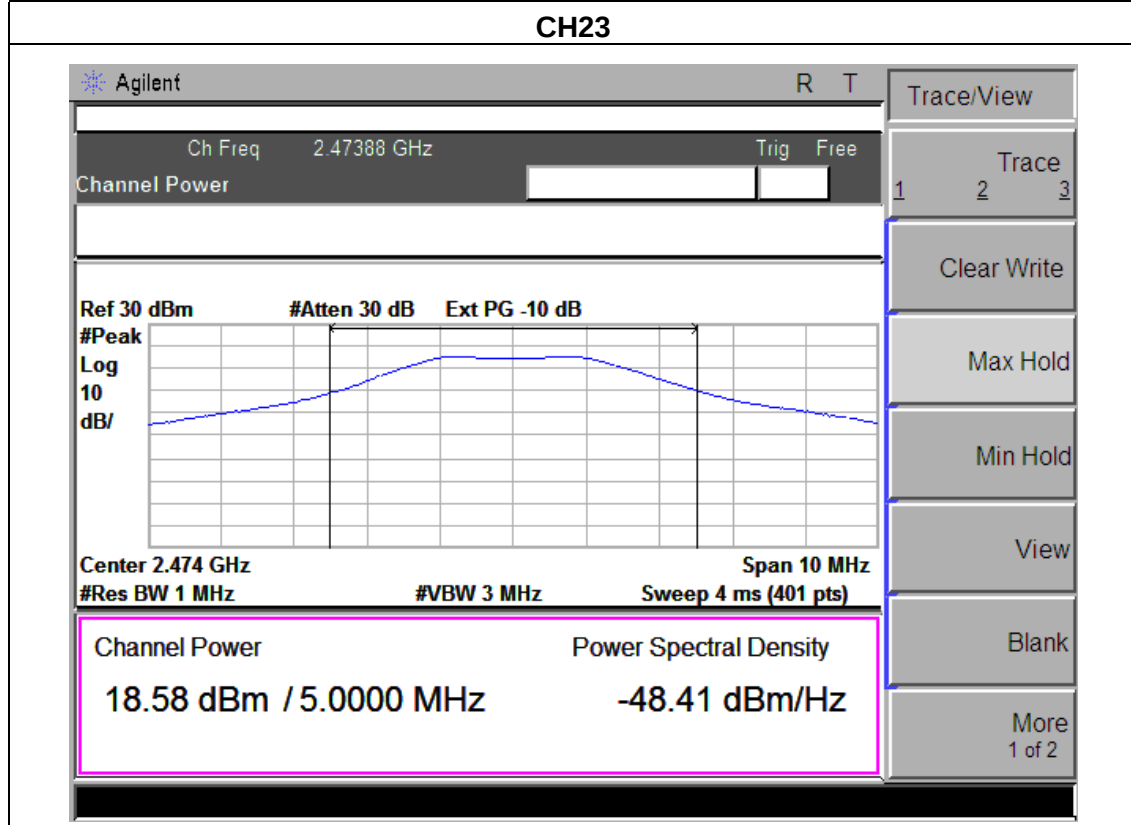
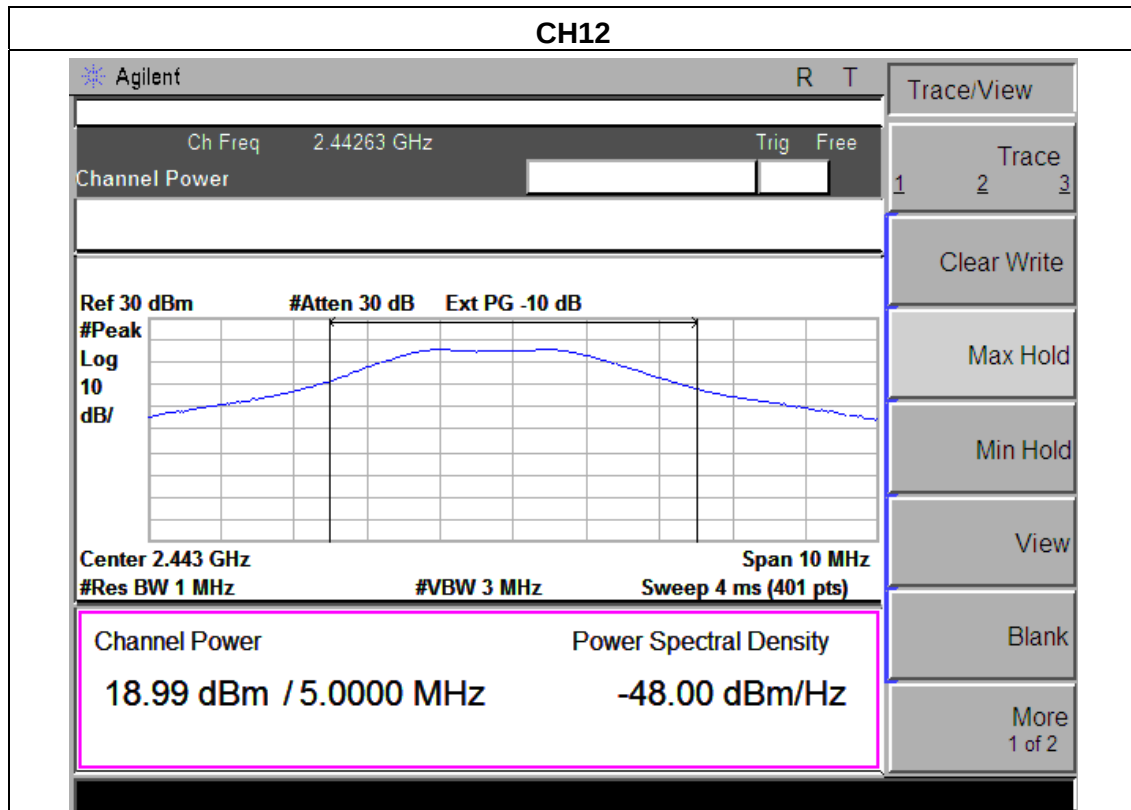
8.1.5 TEST RESULTS

EUT :	wireless camera	Model Name :	890
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 5.0V from adapter AC 120V/60Hz
Test Mode :	CH00/ CH12 /CH23		

Test Channel	Frequency (MHz)	Peak Output Power (dBm)	LIMIT (dBm)
CH00	2408.625	19.23	20.96
CH12	2442.625	18.99	20.96
CH23	2473.875	18.58	20.96

CH00





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

- 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.

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

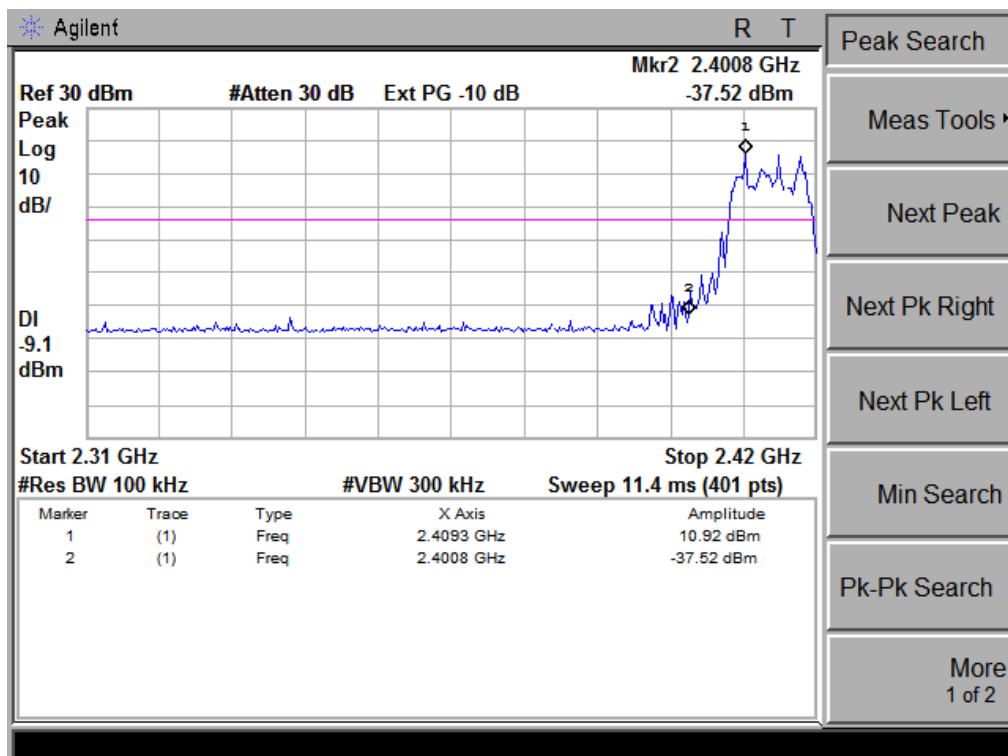
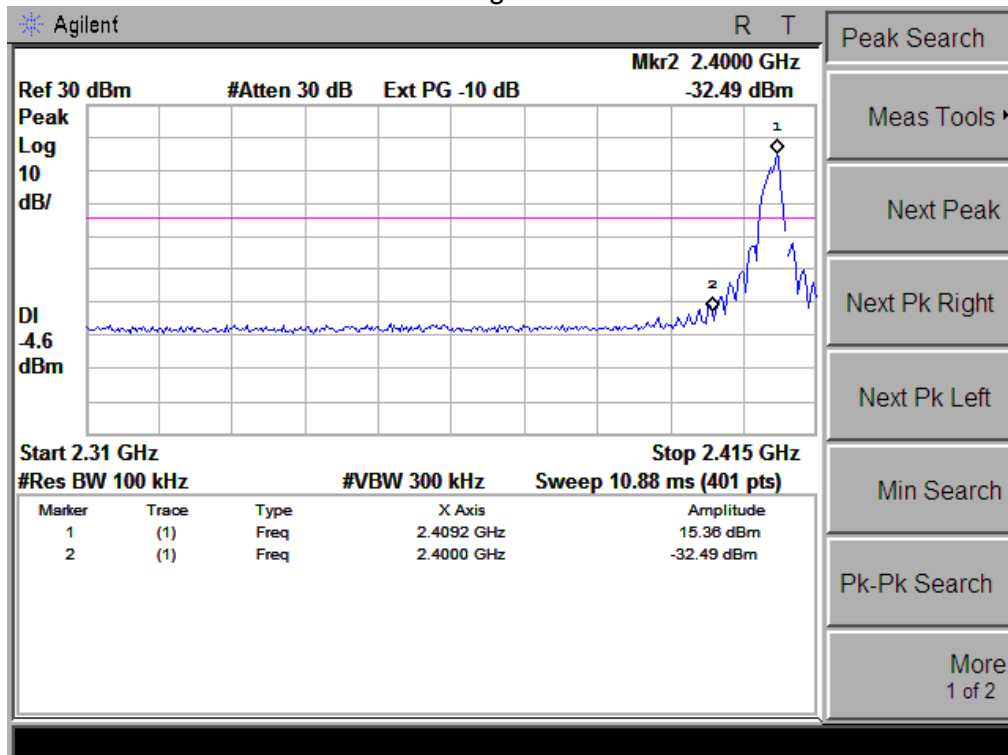
EUT :	wireless camera	Model Name :	890
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 5.0V from adapter AC 120V/60Hz
Test Mode :	CH00/ CH23		

Frequency Band	Delta Peak to band emission(Non-FHSS) (dBc)	Delta Peak to band emission(FHSS) (dBc)	> Limit (dBc)	Result
Left-band	47.85	48.44	20	Pass
Right-band	50.45	49.46	20	Pass

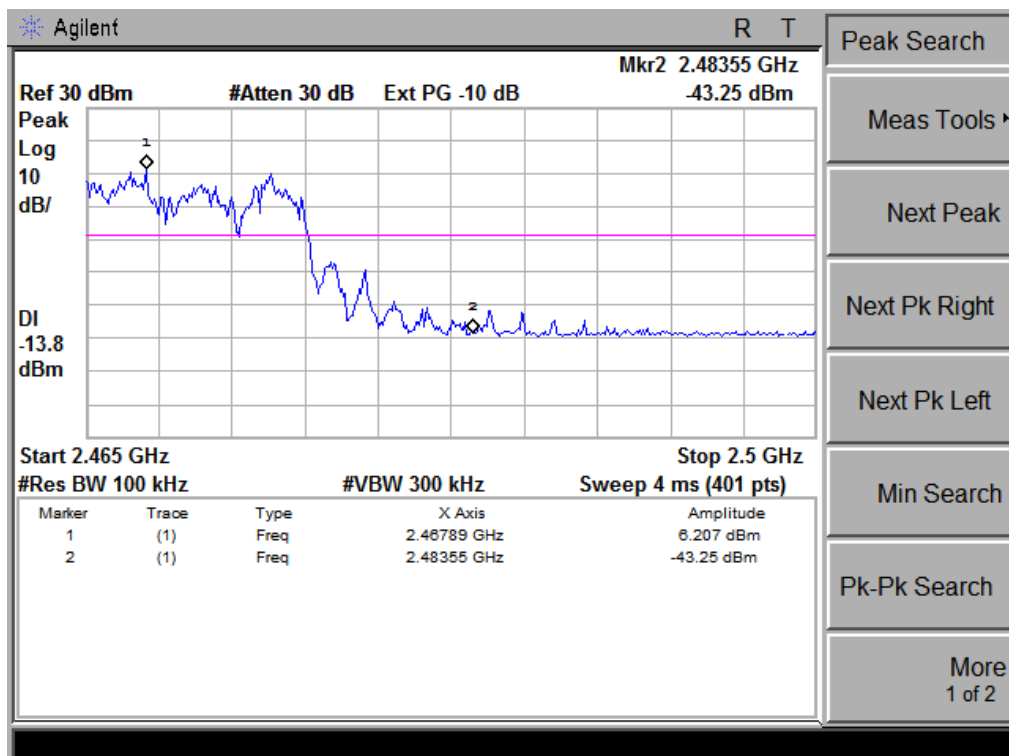
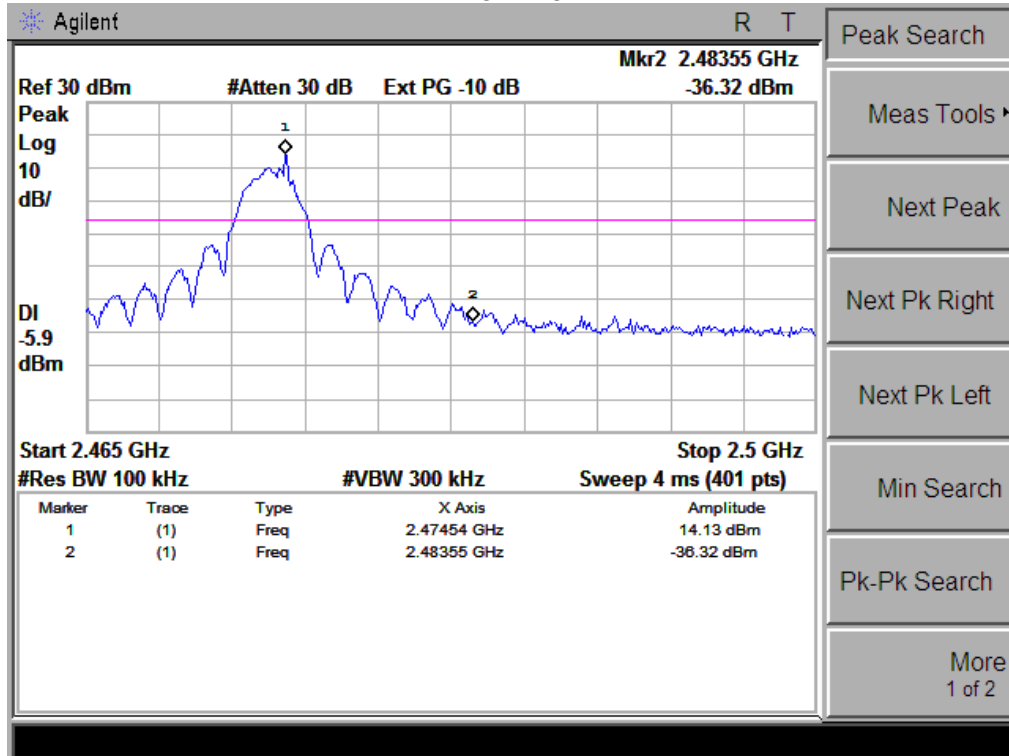
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
Non-FHSS							
2390	61.14	-13.06	48.08	74.00	-25.92	peak	Vertical
2390	62.58	-13.06	49.52	74.00	-24.48	peak	Horizontal
2483.5	57.41	-12.78	44.63	74.00	-29.37	peak	Vertical
2483.5	58.77	-12.78	45.99	74.00	-28.01	peak	Horizontal
FHSS							
2390	61.81	-13.06	48.75	74.00	-25.25	peak	Vertical
2390	62.59	-13.06	49.53	74.00	-24.47	peak	Horizontal
2483.5	57.82	-12.78	45.04	74.00	-28.96	peak	Vertical
2483.5	57.20	-12.78	44.42	74.00	-29.58	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

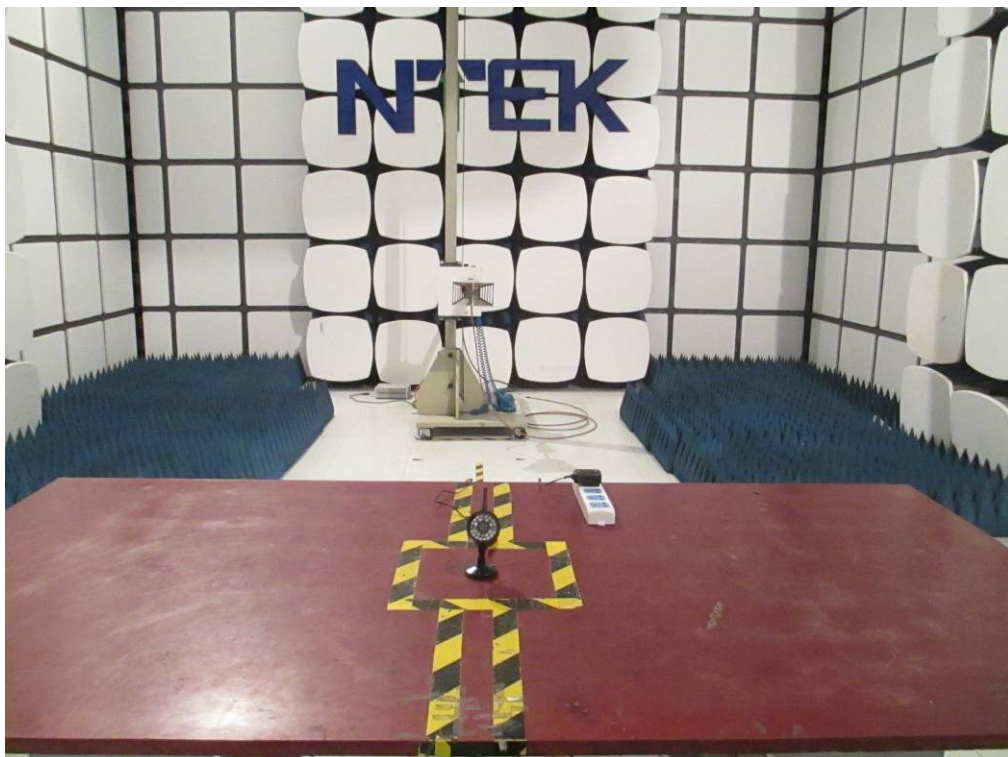
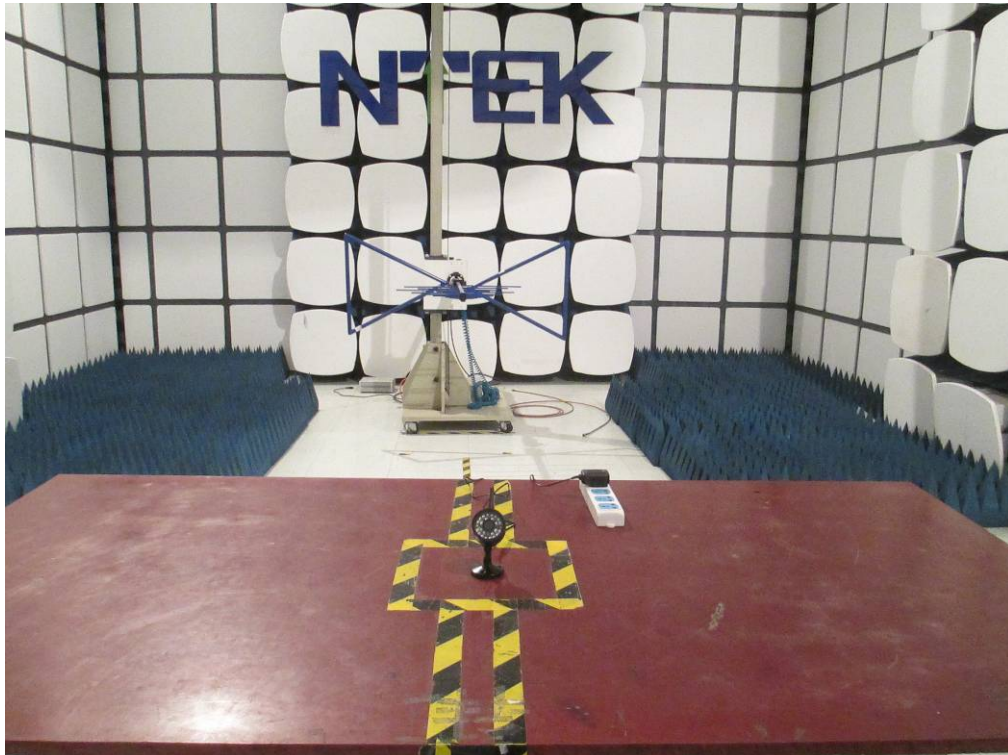
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

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

