

FCC Radio Test Report

FCC ID: A6M-200MON

Original Grant

Report No. : TB-FCC149366
Applicant : Trail Ridge Technologies, LLC
Equipment Under Test (EUT)
EUT Name : QuickVu Digital Backup Camera
Model No. : 200
Series No. : N/A
Brand Name : QuickVu
Receipt Date : 2016-07-29
Test Date : 2016-07-30 to 2016-08-18
Issue Date : 2016-08-19
Standards : FCC Part 15, Subpart C (15.247:2015)
Test Method : ANSI C63.10: 2013
Conclusions : **PASS**

In the configuration tested, the EUT complied with the standards specified above,
The EUT technically complies with the FCC and IC requirements

Test/Witness Engineer :

IVAN SU

**Approved &
Authorized**

:

Ray



This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

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1. General Information about EUT

1.1 Client Information

Applicant : Trail Ridge Technologies, LLC
Address : 3706 Ashmount Dr, Fort Collins, Colorado, USA
Manufacturer : Trail Ridge Technologies, LLC
Address : 3706 Ashmount Dr, Fort Collins, Colorado, USA

1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	QuickVu Digital Backup Camera	
Models No.	:	200	
Model Difference	:	N/A	
Product Description	:	Operation Frequency: 2402MHz~2474MHz	
		Number of Channel:	73 channels see note(3)
		Max Peak Output Power:	GFSK (1Mbps): 17.68 dBm GFSK (2Mbps): 17.64 dBm
		Antenna Gain:	3.3 dBi PCB Antenna
		Modulation Type:	GFSK
		Bit Rate of Transmitter:	GFSK (1Mbps, 250KHz deviation) GFSK (2Mbps, 500KHz deviation)
Power Supply	:	DC power supplied by Battery.	
Power Rating	:	DC power 12V Battery.	
Connecting I/O Port(S)	:	Please refer to the User's Manual	

Note:

- (1) This Test Report is FCC Part 15.247 for 2.4G ISM, the test procedure follows the FCC KDB 558074 D01 DTS Meas Guidance v03r05.
- (2) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- (3) Channel List:

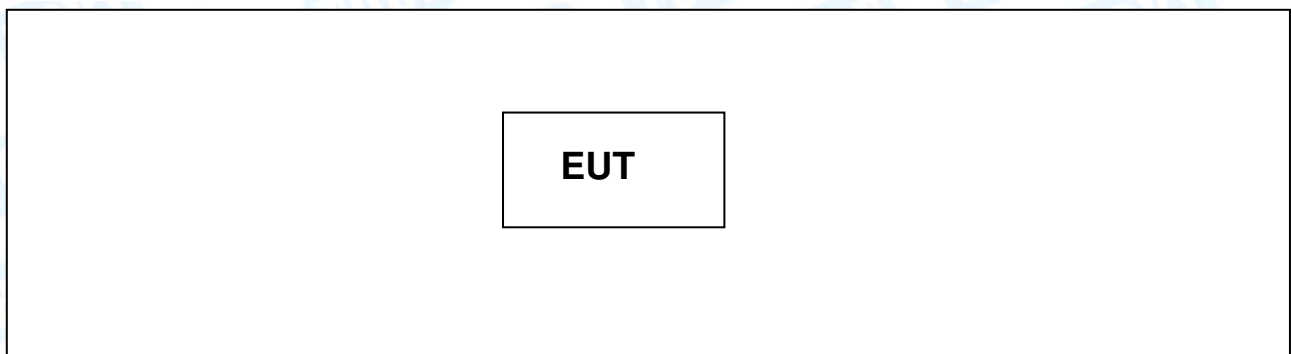
Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457

02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448		
20	2422	47	2449		
21	2423	48	2450		
22	2424	49	2451		
23	2425	50	2452		
24	2426	51	2453		
25	2427	52	2454		
26	2428	53	2455		

(4) The Antenna information about the equipment is provided by the applicant.

1.3 Block Diagram Showing the Configuration of System Tested

TX Mode



1.4 Description of Support Units

The EUT has been test as an independent unit

1.5 Description of Test Mode

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 follow was evaluated respectively.

For Conducted Test	
Final Test Mode	Description
Mode 1	TX Mode

For Radiated Test	
Final Test Mode	Description
Mode 2	TX Mode Channel 00/37/72

Note:

- (1) For all test, we have verified the construction and function in typical operation. And all the test modes were carried out with the EUT in transmitting operation in maximum power with all kinds of data rate.
According to ANSI C63.10 standards, the measurements are performed at the highest, middle, lowest available channels, and the worst case data rate as follows:
TX Mode: GFSK (1 Mbps)
TX Mode: GFSK (2 Mbps)
- (2) During the testing procedure, the continuously transmitting with the maximum power mode was programmed by the customer.
- (3) The EUT is considered a mobile unit; in normal use it was positioned on X-plane. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test.

1.6 Description of Test 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 WLAN.

Test Software Version	SmartRF Studio 7		
Channel	CH 00	CH 37	CH 72
GFSK(1Mbps)	DEF	DEF	DEF
GFSK(2Mbps)	DEF	DEF	DEF

1.7 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 %.

Test Item	Parameters	Expanded Uncertainty (U_{Lab})
Conducted Emission	Level Accuracy: 9kHz~150kHz 150kHz to 30MHz	± 3.42 dB ± 3.42 dB
Radiated Emission	Level Accuracy: 9kHz to 30 MHz	± 4.60 dB
Radiated Emission	Level Accuracy: 30MHz to 1000 MHz	± 4.40 dB
Radiated Emission	Level Accuracy: Above 1000MHz	± 4.20 dB

1.8 Test Facility

The testing report were performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at 1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China. At the time of testing, the following bodies accredited the Laboratory:

CNAS (L5813)

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

FCC List No.: (811562)

The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number is 811562.

IC Registration No.: (11950A-1)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A-1.

2. Test Summary

FCC Part 15 Subpart C(15.247)/ RSS 247 Issue 1				
Standard Section		Test Item	Judgment	Remark
FCC	IC			
15.203	/	Antenna Requirement	PASS	N/A
15.207	RSS-GEN 7.2.4	Conducted Emission	N/A	(1)
15.205	RSS-GEN 7.2.2	Restricted Bands	PASS	N/A
15.247(a)(2)	RSS 247 5.2 (1)	6dB Bandwidth	PASS	N/A
15.247(b)	RSS 247 5.4 (4)	Peak Output Power	PASS	N/A
15.247(e)	RSS 247 5.2 (2)	Power Spectral Density	PASS	N/A
15.247(d)	RSS 247 5.5	Transmitter Radiated Spurious Emission	PASS	N/A
Note (1)The EUT is powered by DC battery, no requirement for this test item. N/A is an abbreviation for Not Applicable.				

3. Test Equipment

Conducted Emission Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Jul. 22, 2016	Jul. 21, 2017
RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	34403	Jul. 22, 2016	Jul. 21, 2017
AMN	SCHWARZBECK	NNBL 8226-2	8226-2/164	Jul. 22, 2016	Jul. 21, 2017
LISN	Rohde & Schwarz	ENV216	101131	Jul. 22, 2016	Jul. 21, 2017
Radiation Emission Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 22, 2016	Jul. 21, 2017
EMI Test Receiver	Rohde & Schwarz	ESPI	100010/007	Jul. 22, 2016	Jul. 21, 2017
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 20, 2016	Mar. 19, 2017
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar. 20, 2016	Mar. 19, 2017
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 19, 2016	Mar. 18, 2017
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar. 19, 2016	Mar. 18, 2017
Pre-amplifier	Sonoma	310N	185903	Mar. 20, 2016	Mar. 19, 2017
Pre-amplifier	HP	8447B	3008A00849	Mar. 26, 2016	Mar. 25, 2017
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 26, 2016	Mar. 25, 2017
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A
Antenna Conducted Emission					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 22, 2016	Jul. 21, 2017
Spectrum Analyzer	Rohde & Schwarz	ESCI	100321	Jul. 22, 2016	Jul. 21, 2017
Power Meter	Anritsu	ML2495A	25406005	Jul. 22, 2016	Jul. 21, 2017
Power Sensor	Anritsu	ML2411B	25406005	Jul. 22, 2016	Jul. 21, 2017

4. Conducted Emission Test

4.1 Test Standard and Limit

4.1.1 Test Standard

FCC Part 15.207

4.1.2 Test Limit

Conducted Emission Test Limit

Frequency	Maximum RF Line Voltage (dB μ V)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

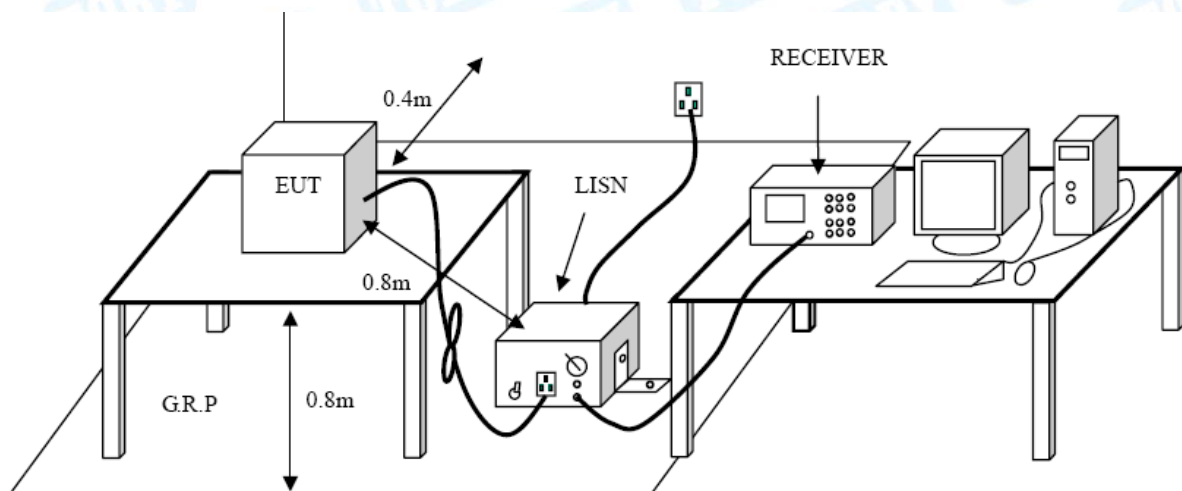
Notes:

(1) *Decreasing linearly with logarithm of the frequency.

(2) The lower limit shall apply at the transition frequencies.

(3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2 Test Setup



4.3 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.

The bandwidth of EMI test receiver is set at 9kHz, and the test frequency band is from 0.15MHz to 30MHz.

4.4 EUT Operating Mode

Please refer to the description of test mode.

4.5 Test Data

The EUT is powered by DC battery, no requirement for this test item.

5. Radiated Emission Test

5.1 Test Standard and Limit

5.1.1 Test Standard

FCC Part 15.209

5.1.2 Test Limit

Radiated Emission Limits (9kHz~1000MHz)

Frequency (MHz)	Field Strength (microvolt/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

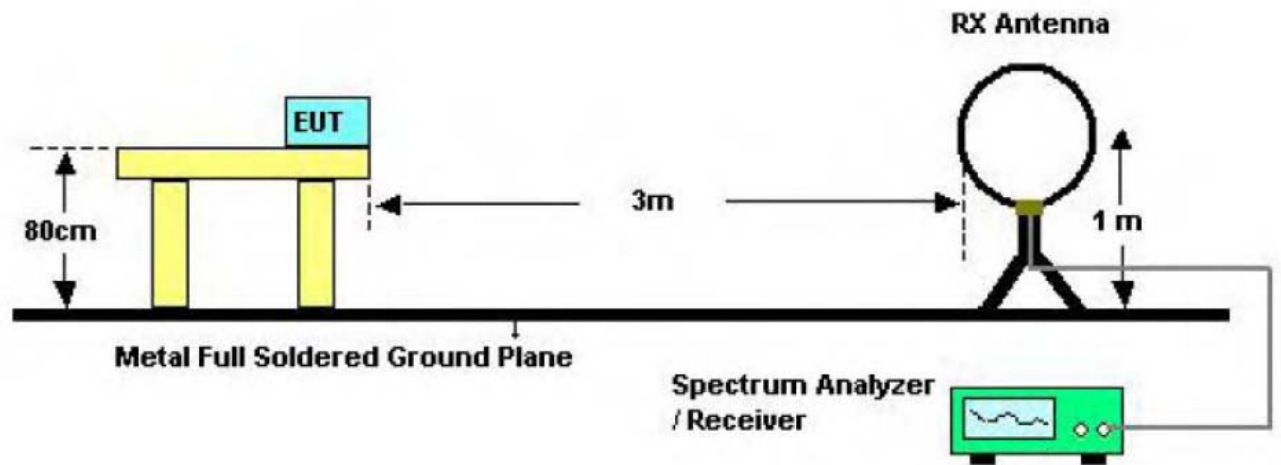
Radiated Emission Limit (Above 1000MHz)

Frequency (MHz)	Class A (dBUV/m)(at 3 M)		Class B (dBUV/m)(at 3 M)	
	Peak	Average	Peak	Average
Above 1000	80	60	74	54

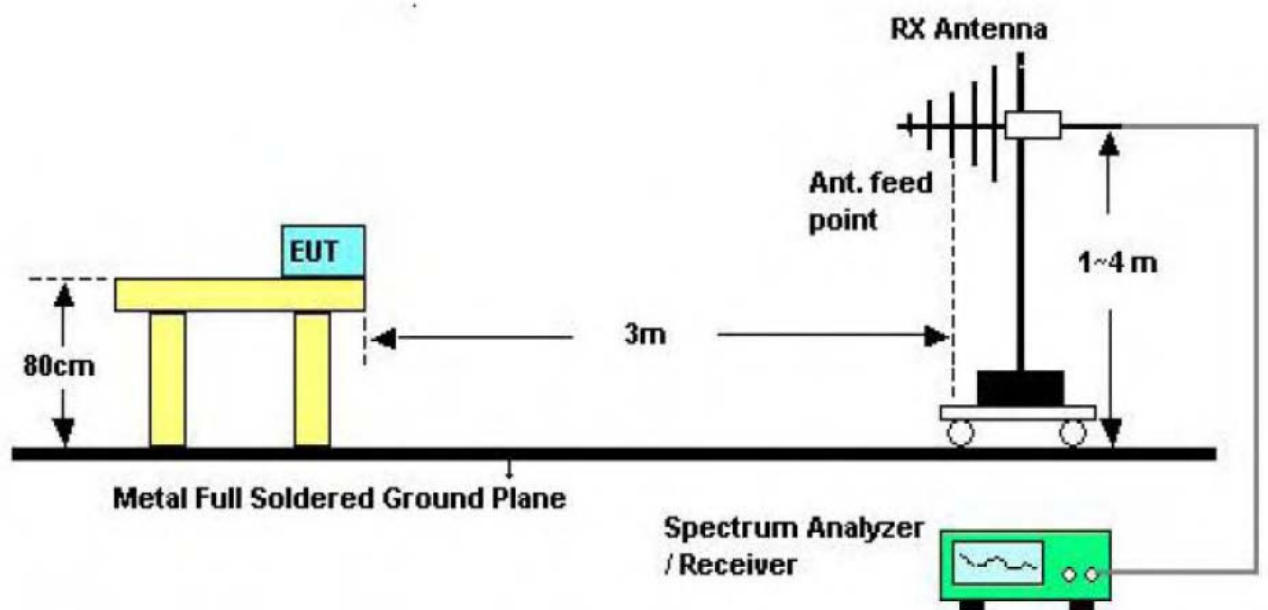
Note:

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

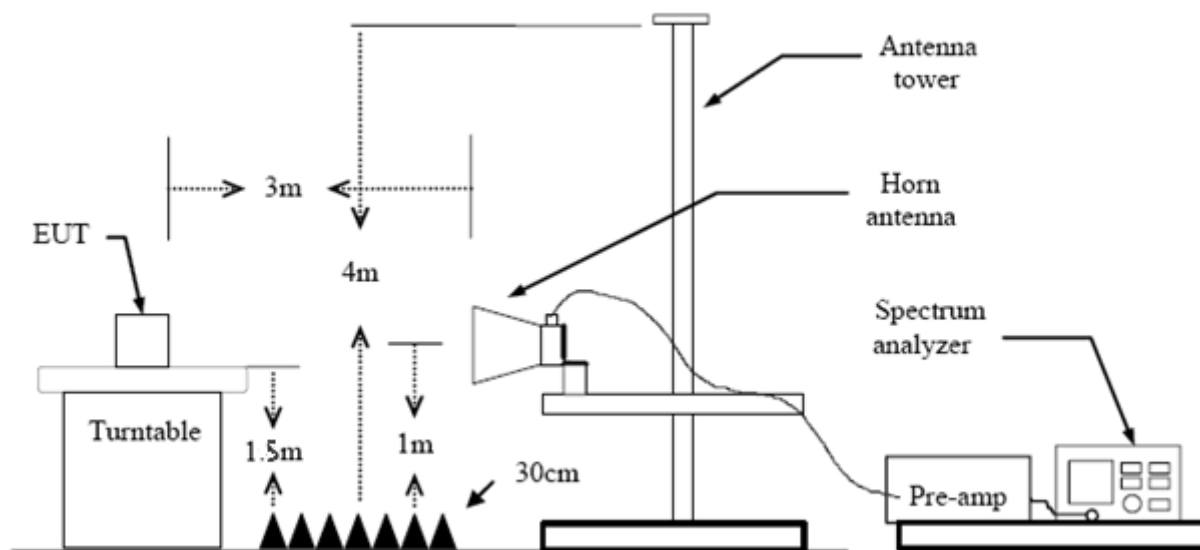
5.2 Test Setup



Below 30MHz Test Setup



Below 1000MHz Test Setup



Above 1GHz Test Setup

5.3 Test Procedure

- (1) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- (2) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (3) 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.
- (4) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (5) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (6) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- (7) For the actual test configuration, please see the test setup photo.

5.4 EUT Operating Condition

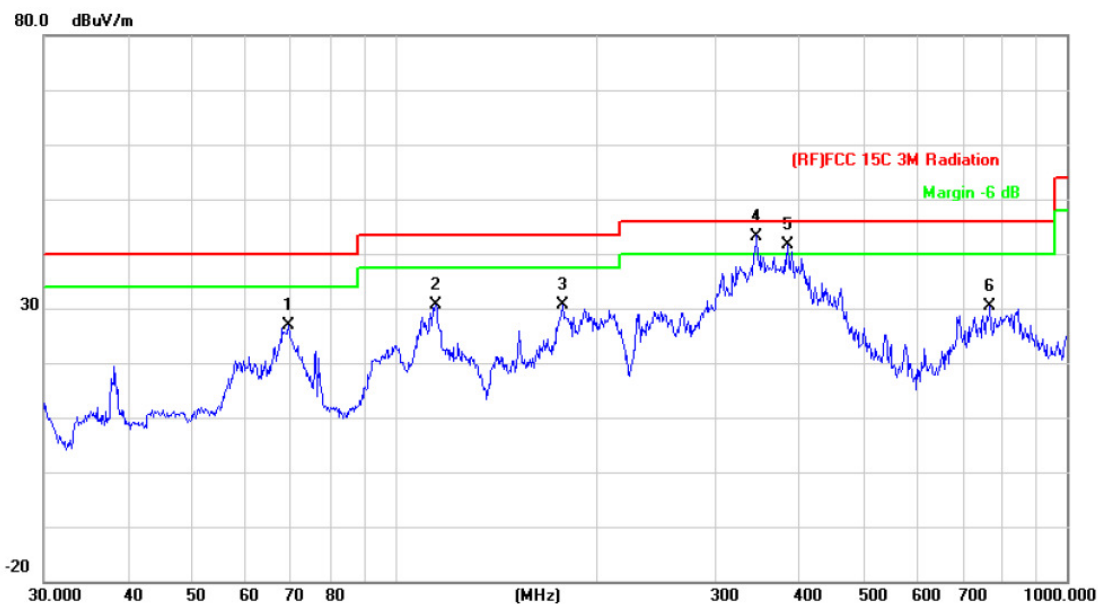
The Equipment Under Test was set to Continual Transmitting in maximum power.

5.5 Test Data

Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.

Test data please refer the following pages.

EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Horizontal		
Test Mode:	TX GFSK(1Mbps) Mode 2402MHz		
Remark:	Only worse case is reported		

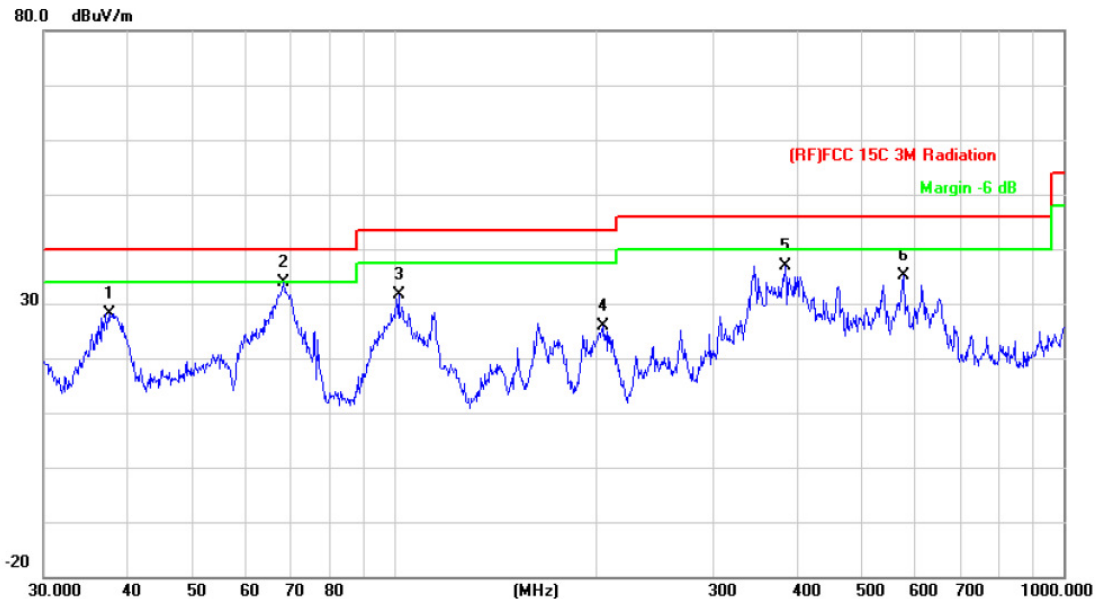


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		69.3568	60.58	-33.74	26.84	40.00	-13.16	peak
2		114.9168	62.73	-32.15	30.58	43.50	-12.92	peak
3		177.5091	61.16	-30.42	30.74	43.50	-12.76	peak
4	*	345.5951	67.68	-24.43	43.25	46.00	-2.75	peak
5	!	383.9318	64.95	-23.41	41.54	46.00	-4.46	peak
6		768.7481	45.99	-15.67	30.32	46.00	-15.68	peak

*:Maximum data x:Over limit !:over margin

Emission Level= Read Level+ Correct Factor

EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Vertical		
Test Mode:	TX GFSK(1Mbps) Mode 2402MHz		
Remark:	Only worse case is reported		

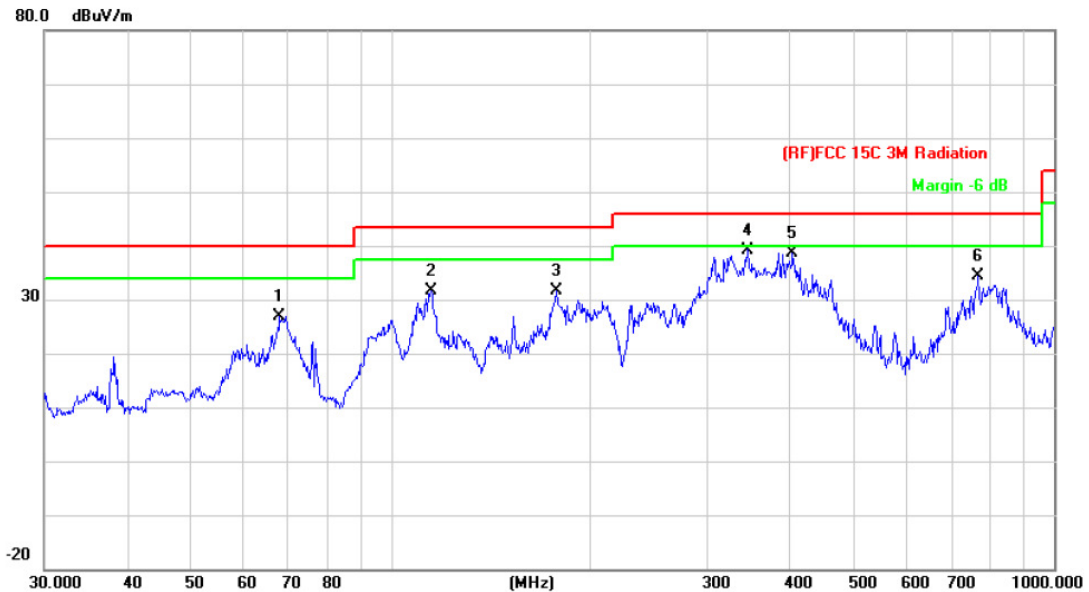


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		37.6798	57.01	-28.87	28.14	40.00	-11.86	peak
2	*	68.3906	67.65	-33.83	33.82	40.00	-6.18	peak
3		101.6443	63.40	-31.84	31.56	43.50	-11.94	peak
4		205.6750	55.54	-29.74	25.80	43.50	-17.70	peak
5		383.9318	60.39	-23.41	36.98	46.00	-9.02	peak
6		576.6443	54.46	-19.41	35.05	46.00	-10.95	peak

*:Maximum data x:Over limit !:over margin

Emission Level= Read Level+ Correct Factor

EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Horizontal		
Test Mode:	TX GFSK(2Mbps) Mode 2402MHz		
Remark:	Only worse case is reported		

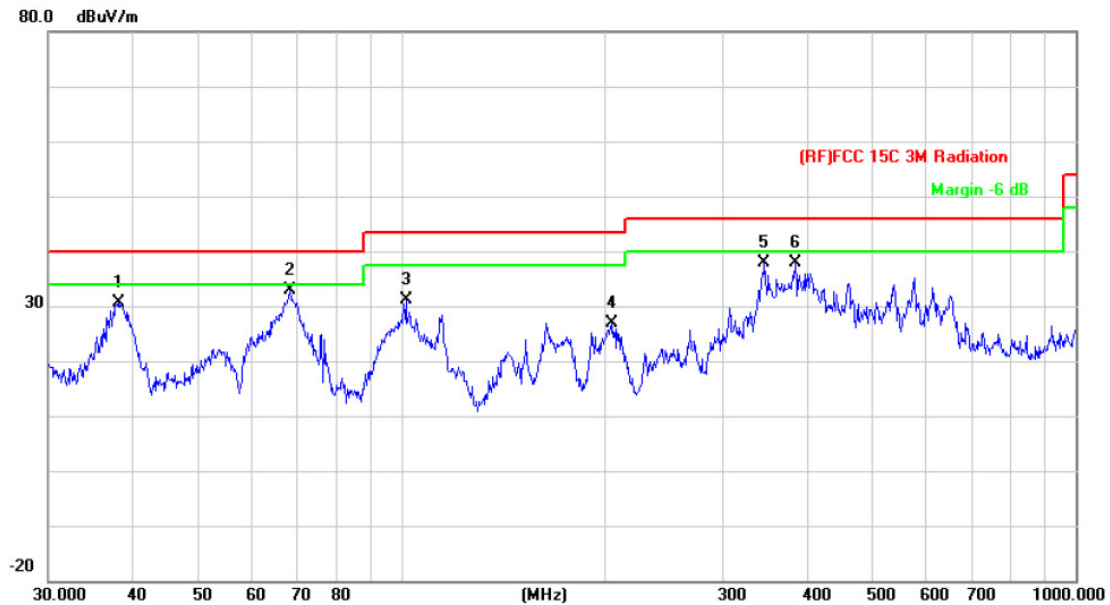


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		67.9128	60.86	-33.87	26.99	40.00	-13.01	peak
2		114.9167	63.73	-32.15	31.58	43.50	-11.92	peak
3		177.5089	62.16	-30.42	31.74	43.50	-11.76	peak
4	*	345.5951	63.68	-24.43	39.25	46.00	-6.75	peak
5		403.2500	61.04	-22.35	38.69	46.00	-7.31	peak
6		768.7481	49.99	-15.67	34.32	46.00	-11.68	peak

*:Maximum data x:Over limit !:over margin

Emission Level= Read Level+ Correct Factor

EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Vertical		
Test Mode:	TX GFSK(2Mbps) Mode 2402MHz		
Remark:	Only worse case is reported		

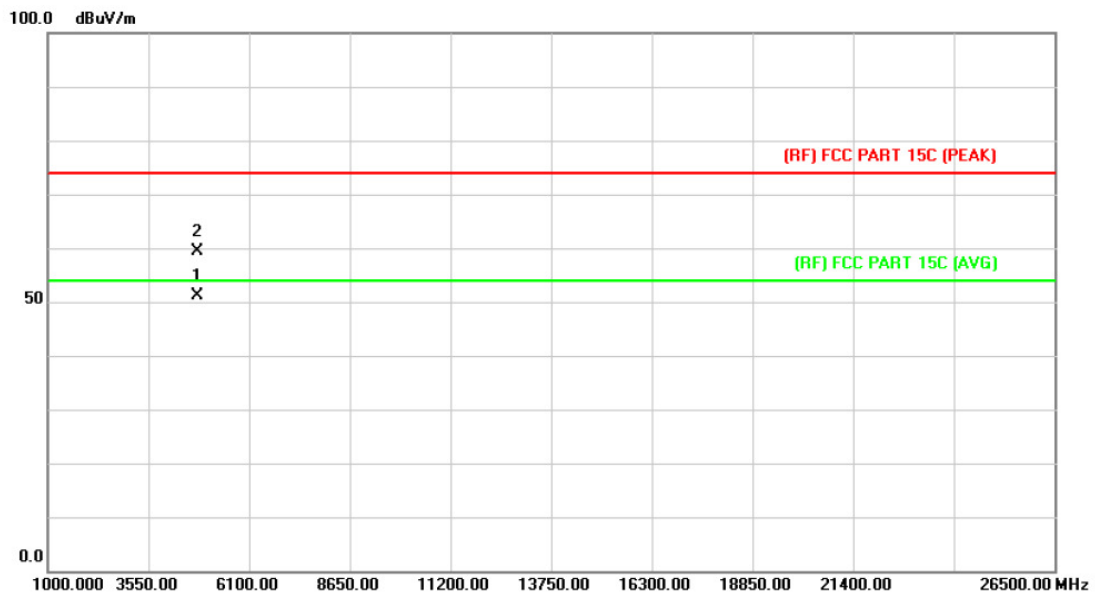


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		38.2120	59.71	-29.20	30.51	40.00	-9.49	peak
2	*	68.3906	66.65	-33.83	32.82	40.00	-7.18	peak
3		101.6443	62.90	-31.84	31.06	43.50	-12.44	peak
4		205.6750	56.54	-29.74	26.80	43.50	-16.70	peak
5		345.5951	62.21	-24.43	37.78	46.00	-8.22	peak
6		383.9318	61.39	-23.41	37.98	46.00	-8.02	peak

*:Maximum data x:Over limit !:over margin

Emission Level= Read Level+ Correct Factor

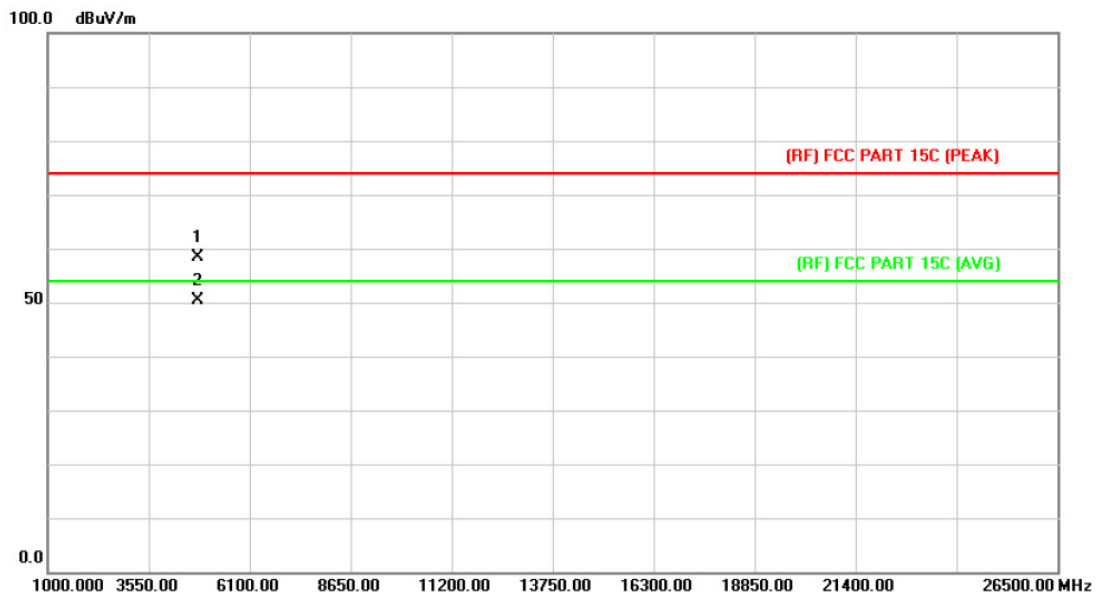
EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Horizontal		
Test Mode:	TX GFSK(1Mbps) Mode 2402MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4803.990	37.62	13.44	51.06	54.00	-2.94	AVG
2		4804.453	45.90	13.44	59.34	74.00	-14.66	peak

Emission Level= Read Level+ Correct Factor

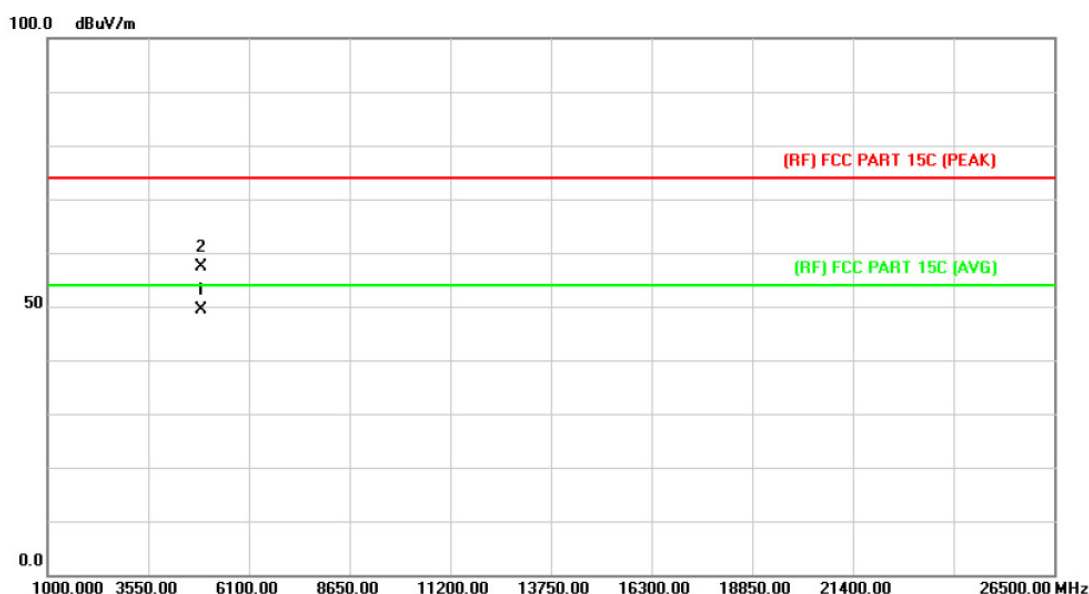
EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Vertical		
Test Mode:	TX GFSK(1Mbps) Mode 2402MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4803.808	45.02	13.44	58.46	74.00	-15.54	peak
2	*	4804.078	36.92	13.44	50.36	54.00	-3.64	AVG

Emission Level= Read Level+ Correct Factor

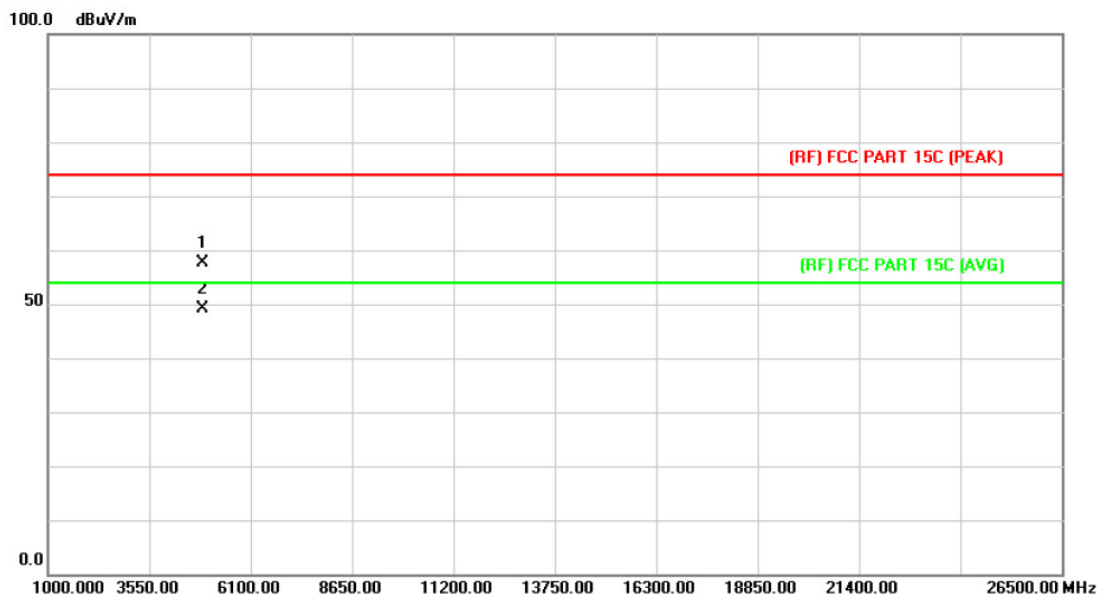
EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Horizontal		
Test Mode:	TX GFSK(1Mbps) Mode 2439MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4878.012	35.49	13.88	49.37	54.00	-4.63	AVG
2		4878.645	43.60	13.88	57.48	74.00	-16.52	peak

Emission Level= Read Level+ Correct Factor

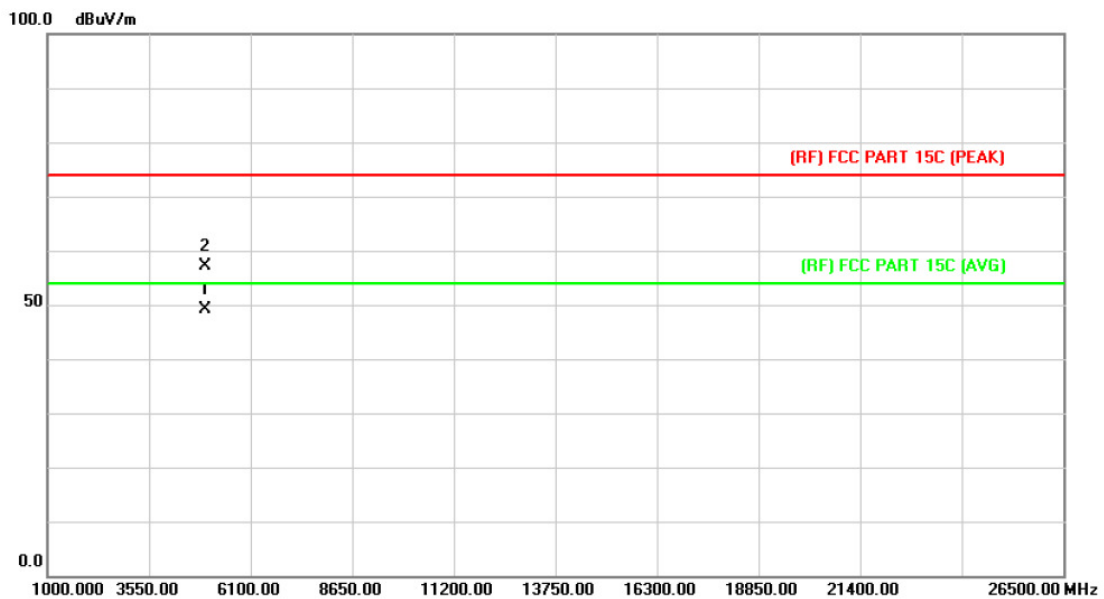
EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Vertical		
Test Mode:	TX GFSK(1Mbps) Mode 2439MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4877.604	43.76	13.88	57.64	74.00	-16.36	peak
2	*	4878.030	35.36	13.88	49.24	54.00	-4.76	AVG

Emission Level= Read Level+ Correct Factor

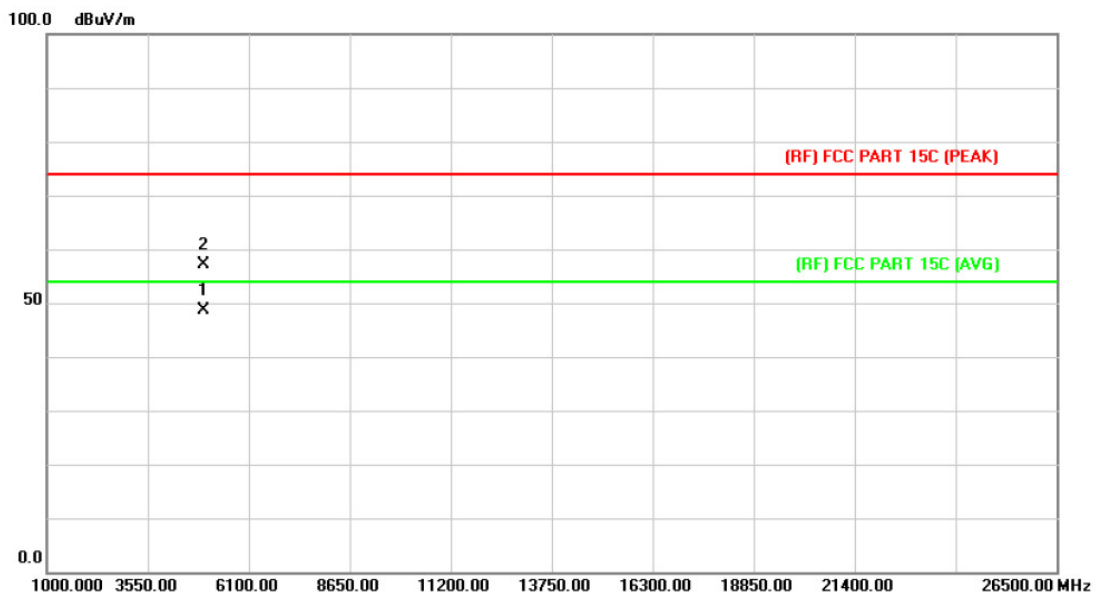
EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Horizontal		
Test Mode:	TX GFSK(1Mbps) Mode 2474MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4948.048	34.77	14.29	49.06	54.00	-4.94	AVG
2		4948.519	42.84	14.29	57.13	74.00	-16.87	peak

Emission Level= Read Level+ Correct Factor

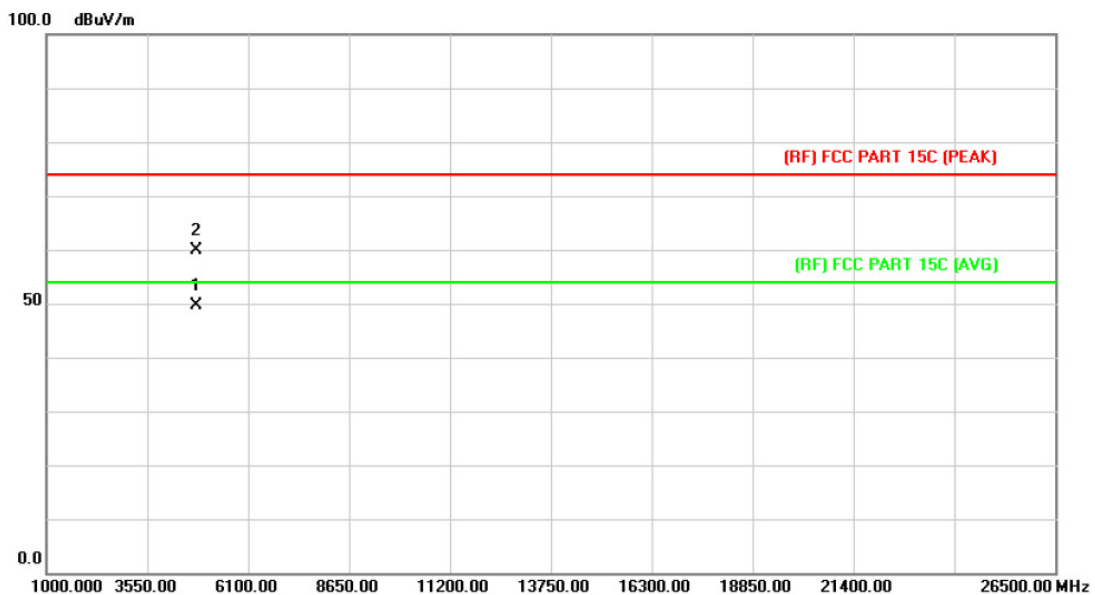
EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Vertical		
Test Mode:	TX GFSK(1Mbps) Mode 2474MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4948.048	34.40	14.29	48.69	54.00	-5.31	AVG
2		4948.486	42.84	14.29	57.13	74.00	-16.87	peak

Emission Level= Read Level+ Correct Factor

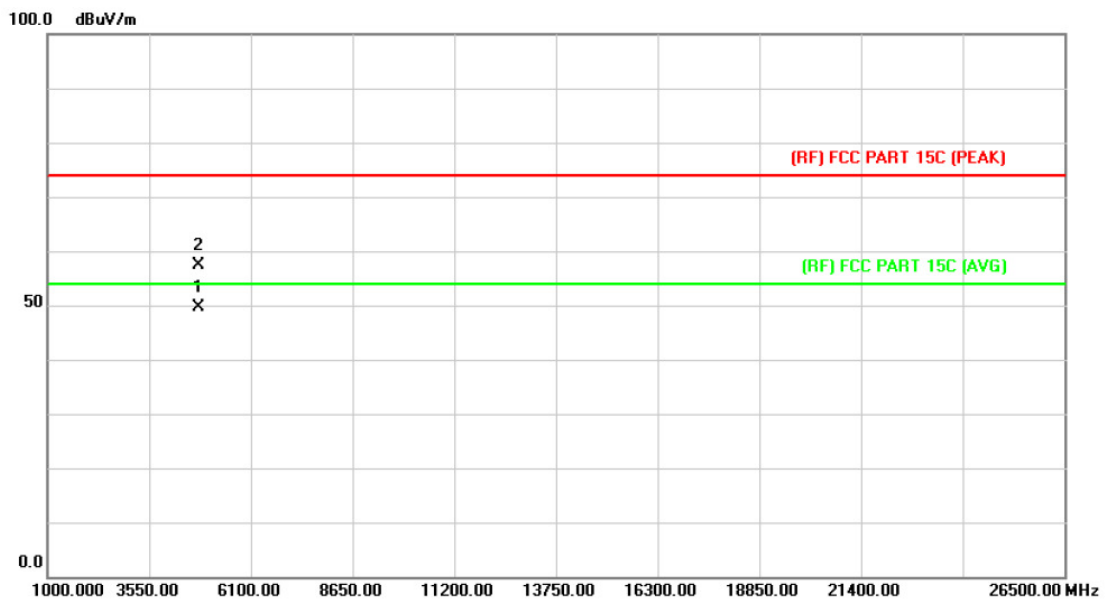
EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Horizontal		
Test Mode:	TX GFSK(2Mbps) Mode 2402MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4804.027	36.14	13.44	49.58	54.00	-4.42	AVG
2		4804.954	46.54	13.44	59.98	74.00	-14.02	peak

Emission Level= Read Level+ Correct Factor

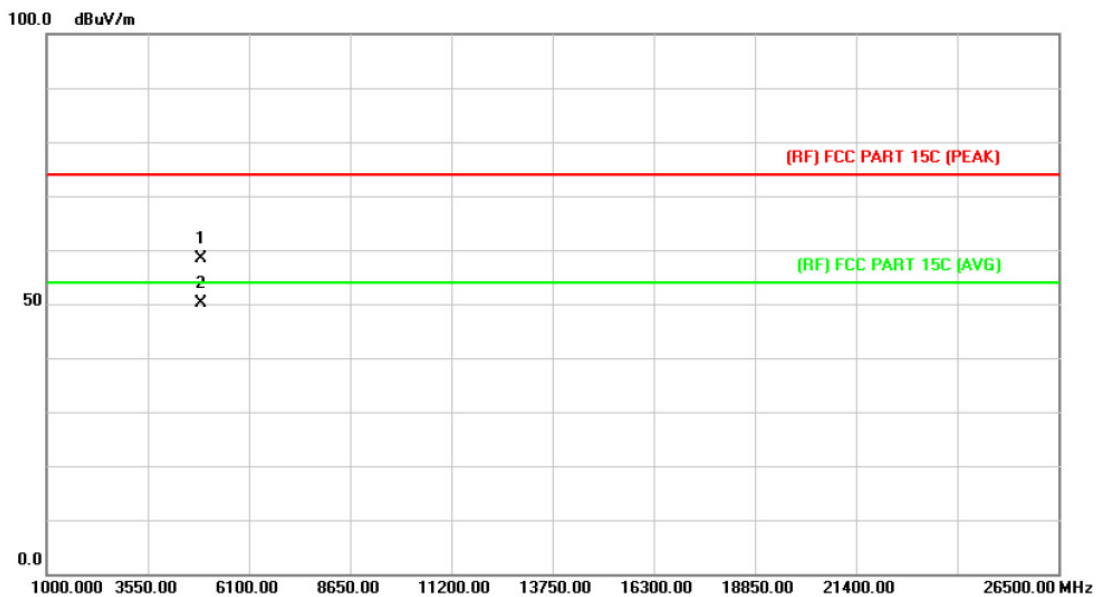
EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Vertical		
Test Mode:	TX GFSK(2Mbps) Mode 2402MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4804.030	36.22	13.44	49.66	54.00	-4.34	AVG
2		4804.885	44.01	13.44	57.45	74.00	-16.55	peak

Emission Level= Read Level+ Correct Factor

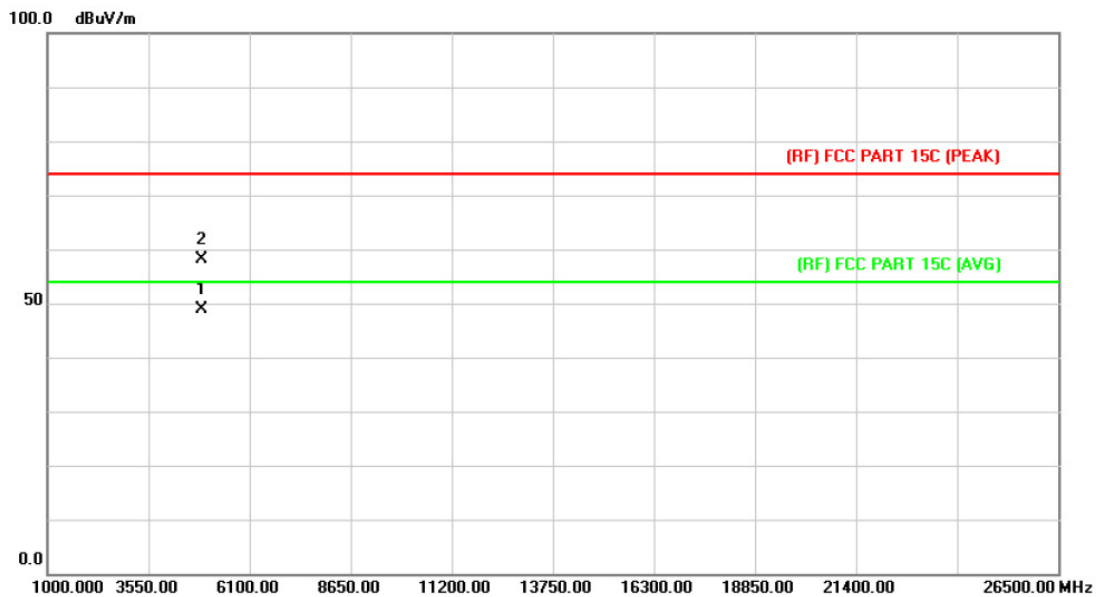
EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Horizontal		
Test Mode:	TX GFSK(2Mbps) Mode 2439MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4877.037	44.53	13.88	58.41	74.00	-15.59	peak
2	*	4878.030	36.14	13.88	50.02	54.00	-3.98	AVG

Emission Level= Read Level+ Correct Factor

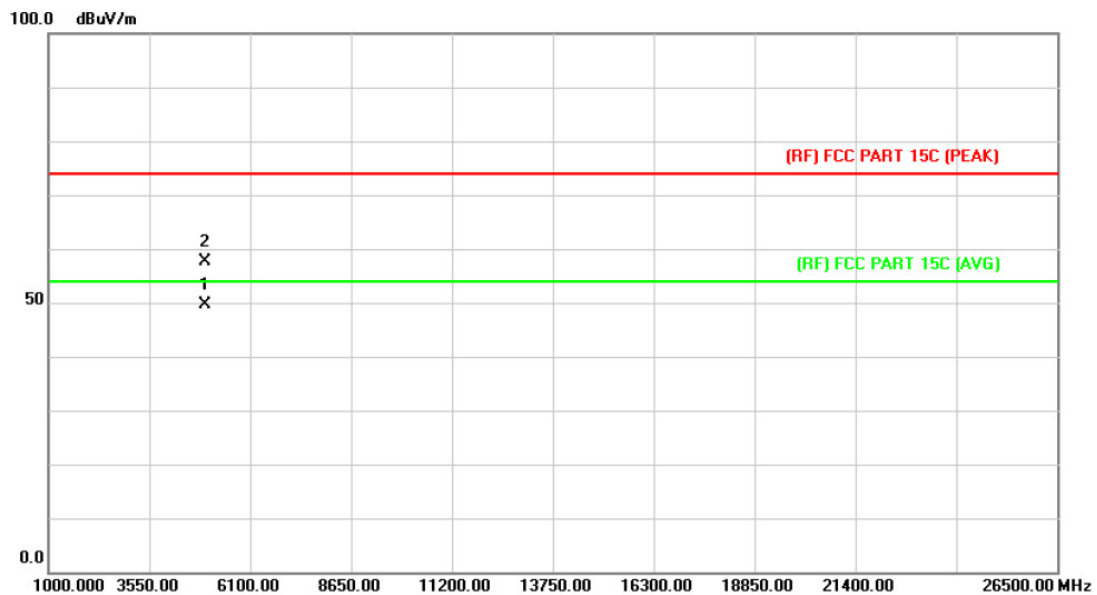
EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Vertical		
Test Mode:	TX GFSK(2Mbps) Mode 2439MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4878.069	35.11	13.88	48.99	54.00	-5.01	AVG
2		4878.825	44.22	13.88	58.10	74.00	-15.90	peak

Emission Level= Read Level+ Correct Factor

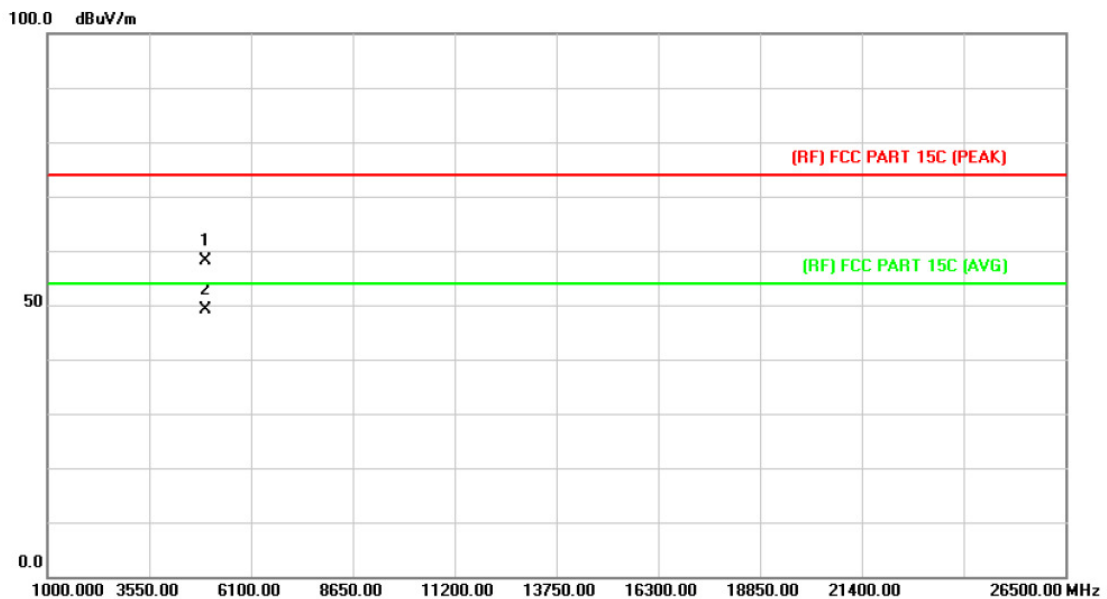
EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Horizontal		
Test Mode:	TX GFSK(2Mbps) Mode 2474MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4947.991	35.22	14.29	49.51	54.00	-4.49	AVG
2		4949.095	43.38	14.30	57.68	74.00	-16.32	peak

Emission Level= Read Level+ Correct Factor

EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Vertical		
Test Mode:	TX GFSK(2Mbps) Mode 2474MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4947.253	43.72	14.29	58.01	74.00	-15.99	peak
2	*	4948.030	34.79	14.29	49.08	54.00	-4.92	AVG

Emission Level= Read Level+ Correct Factor

6. Restricted Bands Requirement

6.1 Test Standard and Limit

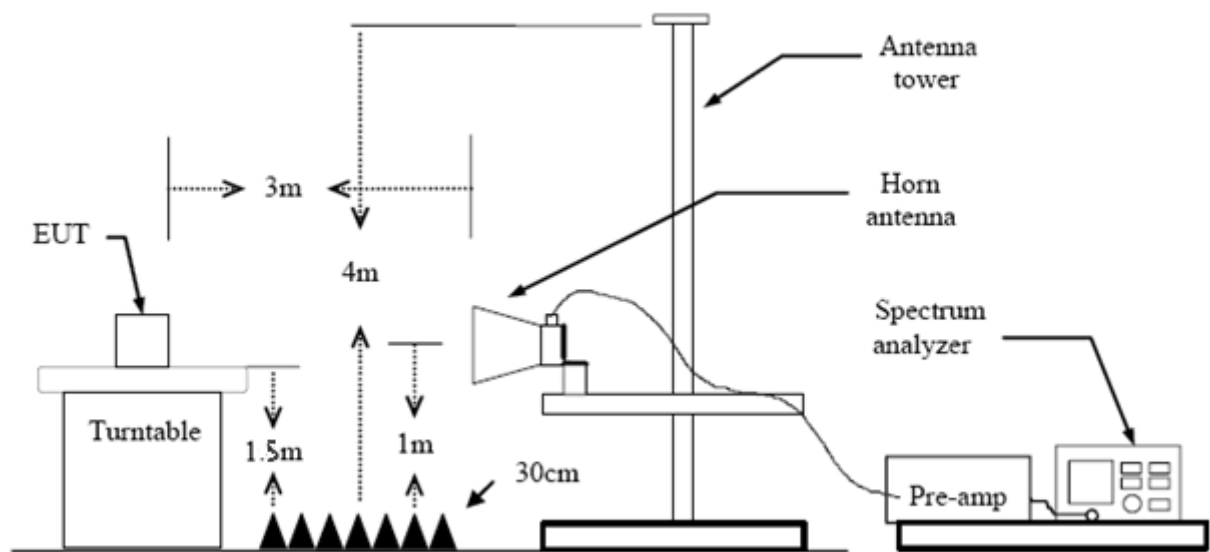
6.1.1 Test Standard

FCC Part 15.209 FCC Part 15.205

6.1.2 Test Limit

Restricted Frequency Band (MHz)	Class B (dBuV/m)(at 3 M)	
	Peak	Average
2310 ~2390	74	54
2483.5 ~2500	74	54

6.2 Test Setup



6.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- (3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.

-
- (4) 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.
 - (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
 - (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
 - (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
 - (8) For the actual test configuration, please see the test setup photo.

6.4 EUT Operating Condition

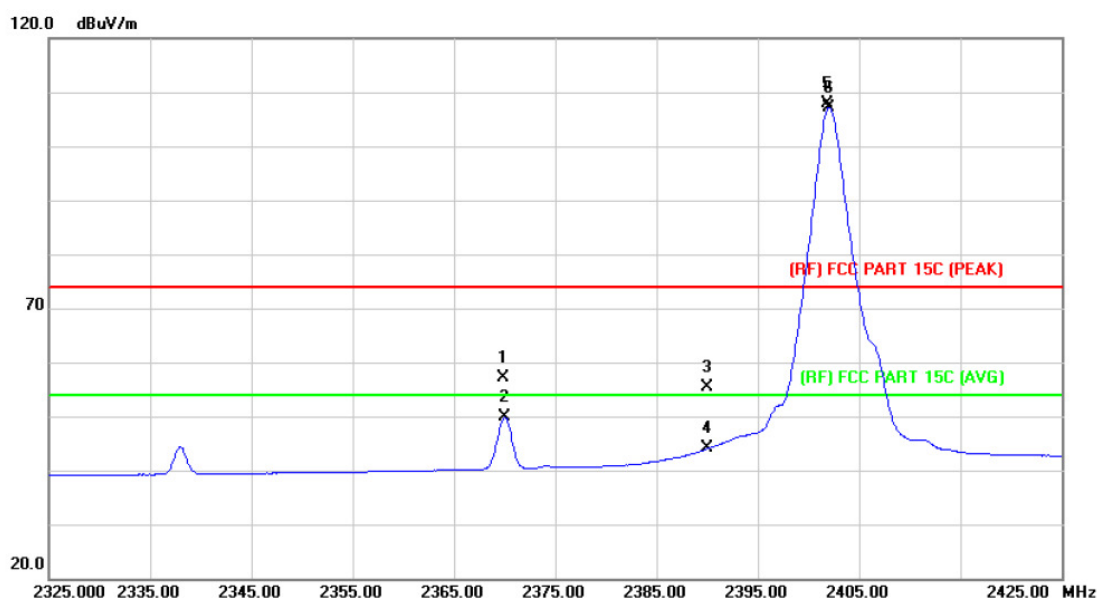
The Equipment Under Test was set to Continual Transmitting in maximum power.

6.5 Test Data

Please see the next page.

(1) Radiation Test

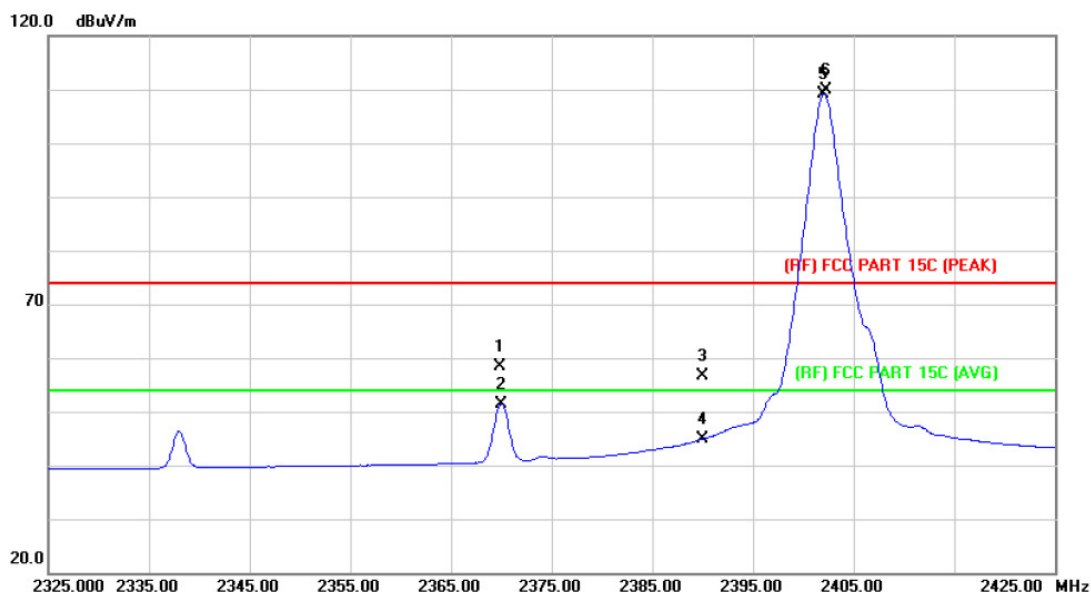
EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Horizontal		
Test Mode:	TX GFSK(1Mbps) Mode 2402MHz		
Remark:	N/A		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		2369.800	56.56	0.68	57.24	74.00	-16.76	peak
2		2370.000	49.07	0.69	49.76	54.00	-4.24	AVG
3		2390.000	54.70	0.77	55.47	74.00	-18.53	peak
4		2390.000	43.24	0.77	44.01	54.00	-9.99	AVG
5	X	2401.800	107.11	0.82	107.93	Fundamental Frequency		peak
6	*	2402.000	106.32	0.82	107.14	Fundamental Frequency		AVG

Emission Level= Read Level+ Correct Factor

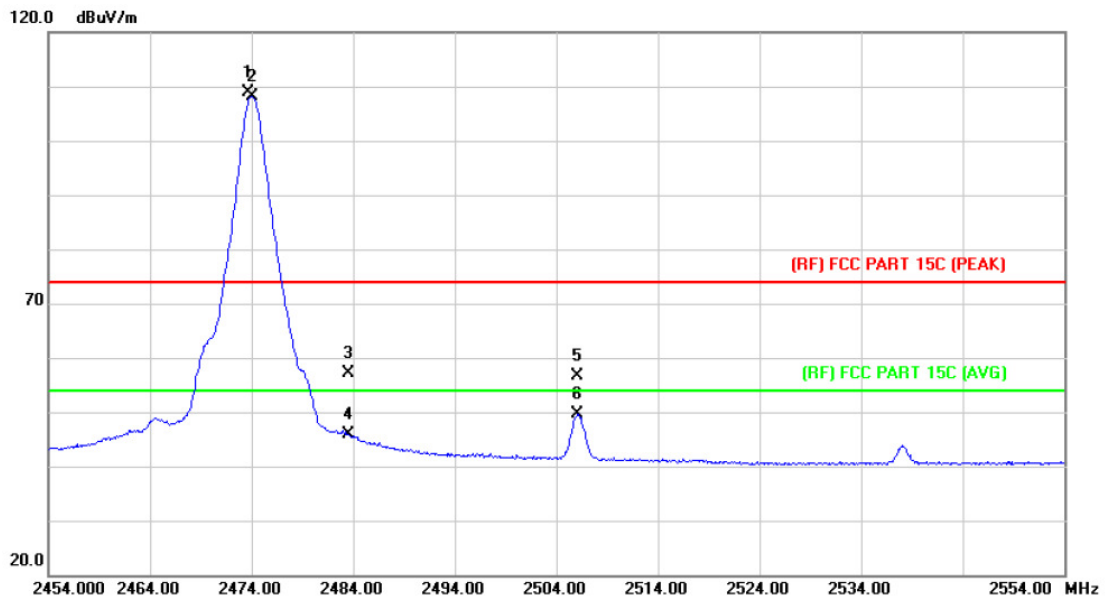
EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Vertical		
Test Mode:	TX GFSK(1Mbps) Mode 2402MHz		
Remark:	N/A		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		2369.900	57.58	0.68	58.26	74.00	-15.74	peak
2		2370.000	50.80	0.69	51.49	54.00	-2.51	AVG
3		2390.000	55.79	0.77	56.56	74.00	-17.44	peak
4		2390.000	44.19	0.77	44.96	54.00	-9.04	AVG
5	*	2402.000	108.32	0.82	109.14	Fundamental Frequency		AVG
6	X	2402.300	109.05	0.82	109.87	Fundamental Frequency		peak

Emission Level= Read Level+ Correct Factor

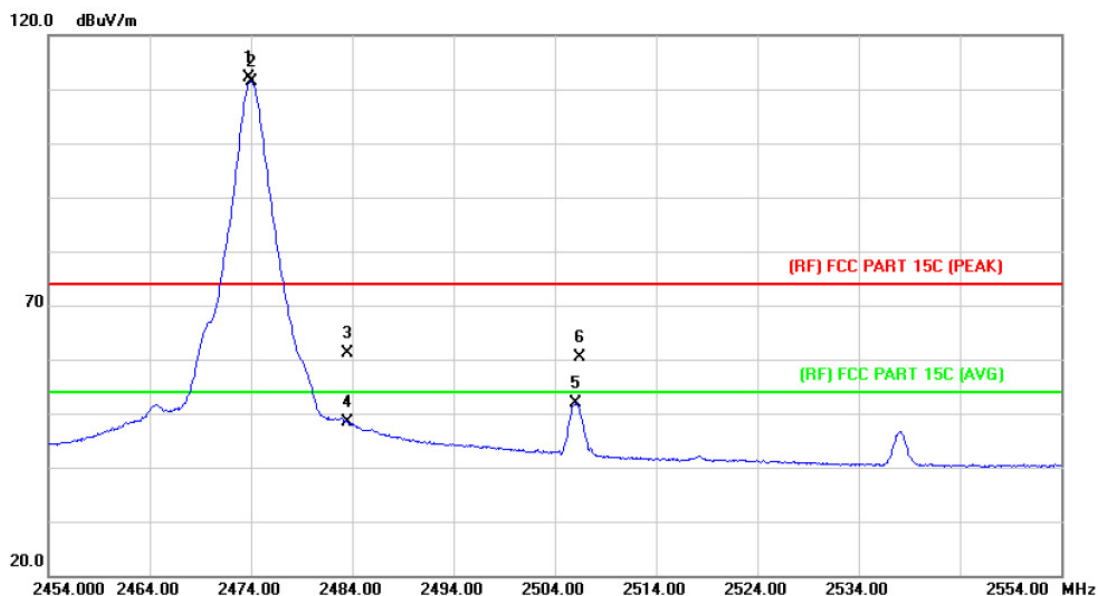
EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Horizontal		
Test Mode:	TX GFSK(1Mbps) Mode 2474MHz		
Remark:	N/A		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	X	2473.700	107.65	1.13	108.78	Fundamental Frequency		peak
2	*	2474.100	107.00	1.13	108.13	Fundamental Frequency		AVG
3		2483.500	56.05	1.17	57.22	74.00	-16.78	peak
4		2483.500	44.64	1.17	45.81	54.00	-8.19	AVG
5		2506.100	55.42	1.27	56.69	74.00	-17.31	peak
6		2506.100	48.31	1.27	49.58	54.00	-4.42	AVG

Emission Level= Read Level+ Correct Factor

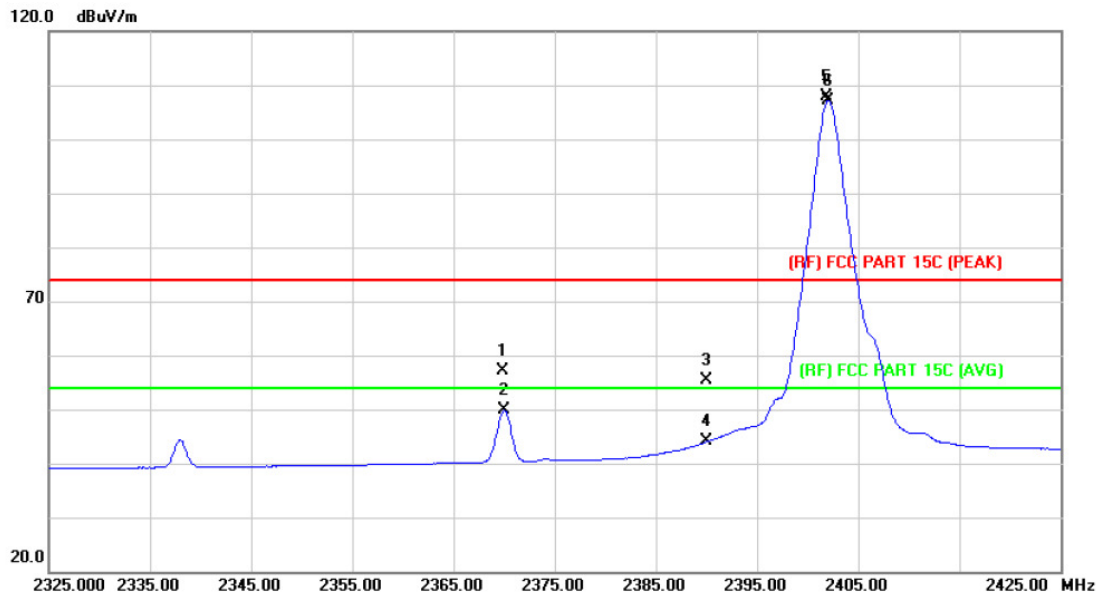
EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Vertical		
Test Mode:	TX GFSK(1Mbps) Mode 2474MHz		
Remark:	N/A		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1	X	2473.800	110.96	1.13	112.09	Fundamental Frequency		peak
2	*	2474.000	110.24	1.13	111.37	Fundamental Frequency		AVG
3		2483.500	59.93	1.17	61.10	74.00	-12.90	peak
4		2483.500	47.31	1.17	48.48	54.00	-5.52	AVG
5		2506.000	50.61	1.27	51.88	54.00	-2.12	AVG
6		2506.400	59.15	1.27	60.42	74.00	-13.58	peak

Emission Level= Read Level+ Correct Factor

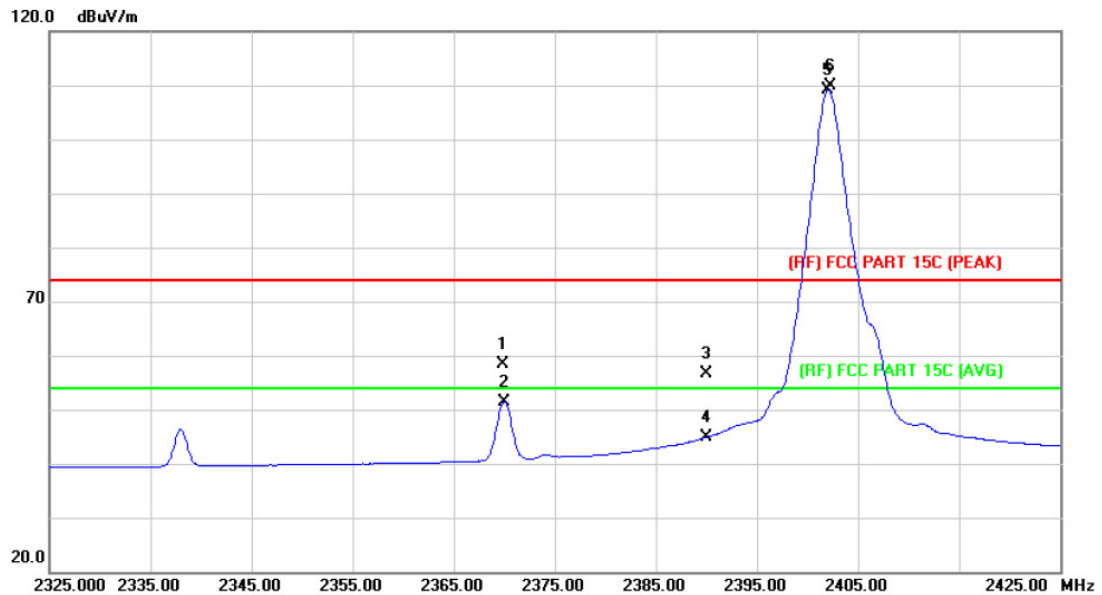
EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Horizontal		
Test Mode:	TX GFSK(2Mbps) Mode 2402MHz		
Remark:	N/A		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		2369.800	56.56	0.68	57.24	74.00	-16.76	peak
2		2370.000	49.07	0.69	49.76	54.00	-4.24	AVG
3		2390.000	54.70	0.77	55.47	74.00	-18.53	peak
4		2390.000	43.24	0.77	44.01	54.00	-9.99	AVG
5	X	2401.800	107.11	0.82	107.93	Fundamental Frequency		peak
6	*	2402.000	106.32	0.82	107.14	Fundamental Frequency		AVG

Emission Level= Read Level+ Correct Factor

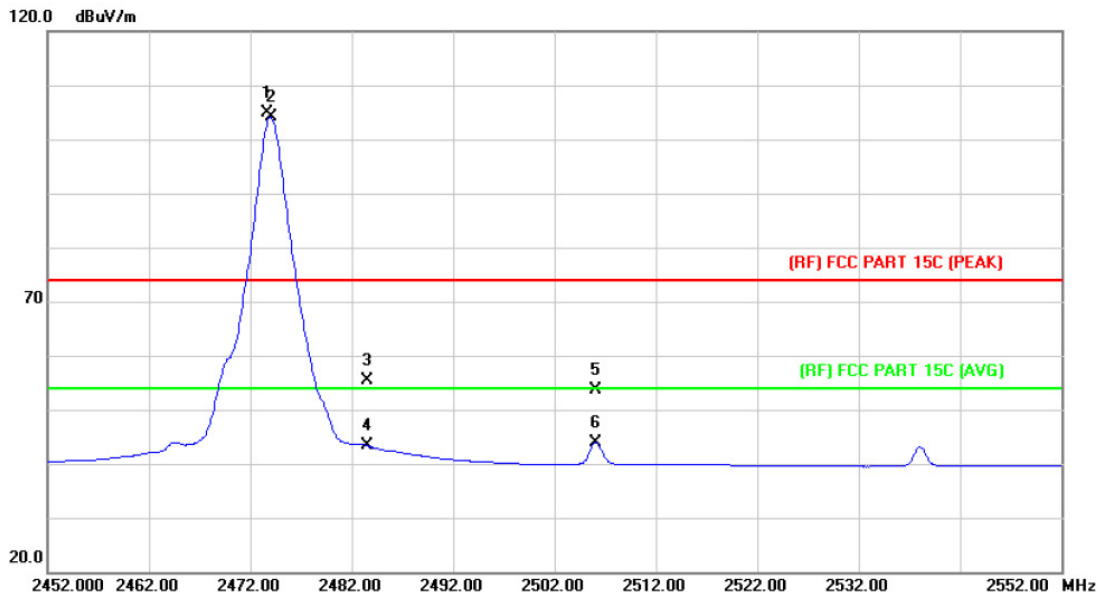
EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Vertical		
Test Mode:	TX GFSK(2Mbps) Mode 2402MHz		
Remark:	N/A		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		2369.900	57.58	0.68	58.26	74.00	-15.74	peak
2		2370.000	50.80	0.69	51.49	54.00	-2.51	AVG
3		2390.000	55.79	0.77	56.56	74.00	-17.44	peak
4		2390.000	44.19	0.77	44.96	54.00	-9.04	AVG
5	*	2402.000	108.32	0.82	109.14	Fundamental Frequency		AVG
6	X	2402.300	109.05	0.82	109.87	Fundamental Frequency		peak

Emission Level= Read Level+ Correct Factor

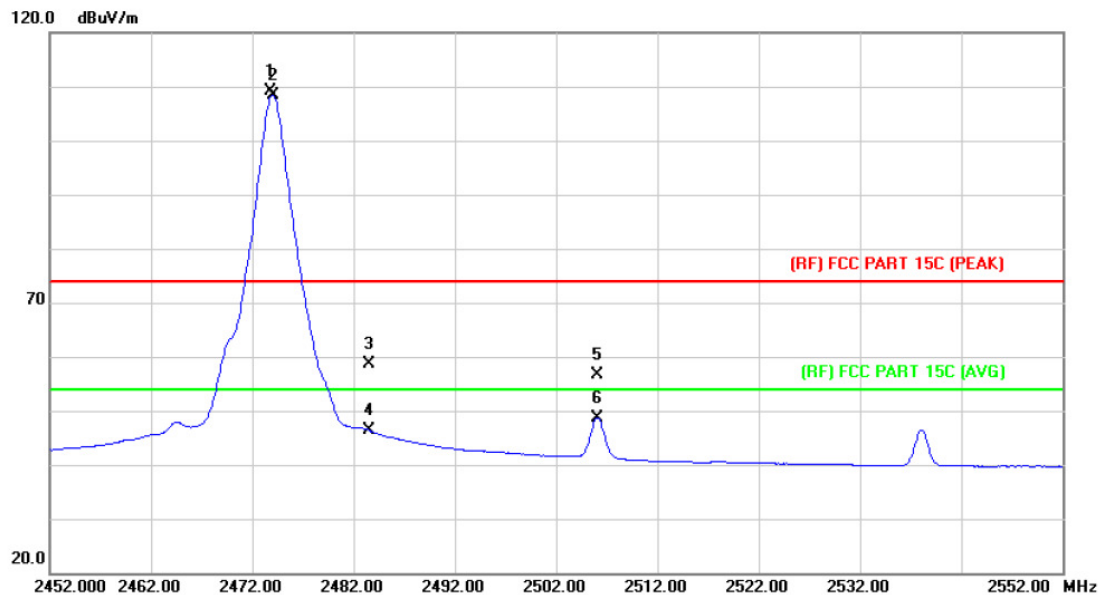
EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Horizontal		
Test Mode:	TX GFSK(2Mbps) Mode 2474MHz		
Remark:	N/A		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1	X	2473.700	103.73	1.13	104.86	Fundamental Frequency		peak
2	*	2474.000	102.94	1.13	104.07	Fundamental Frequency		AVG
3		2483.500	54.33	1.17	55.50	74.00	-18.50	peak
4		2483.500	42.14	1.17	43.31	54.00	-10.69	AVG
5		2506.000	52.25	1.27	53.52	74.00	-20.48	peak
6		2506.000	42.68	1.27	43.95	54.00	-10.05	AVG

Emission Level= Read Level+ Correct Factor

EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Ant. Pol.	Vertical		
Test Mode:	TX GFSK(2Mbps) Mode 2474MHz		
Remark:	N/A		

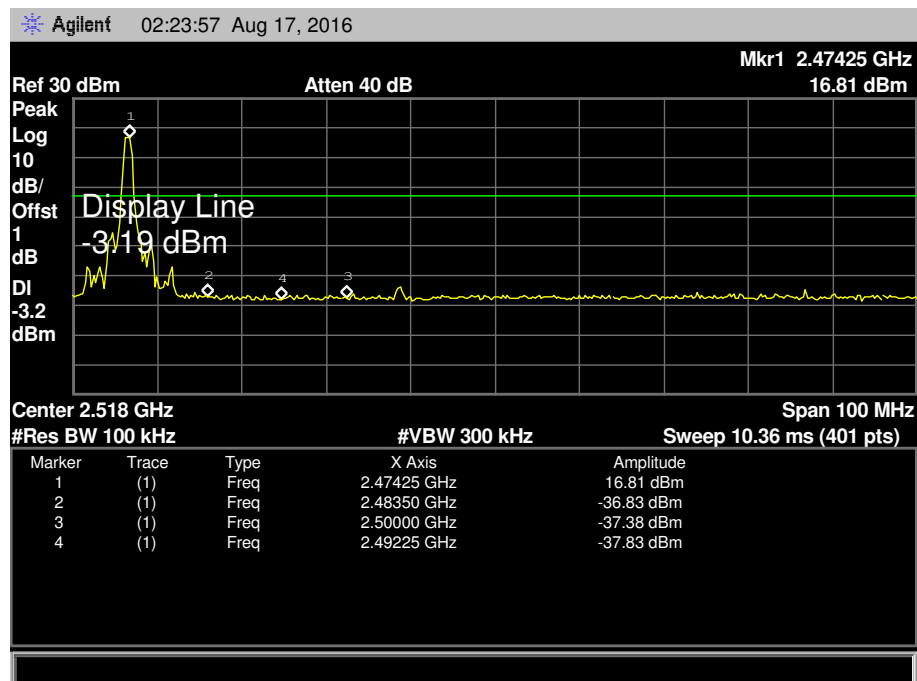
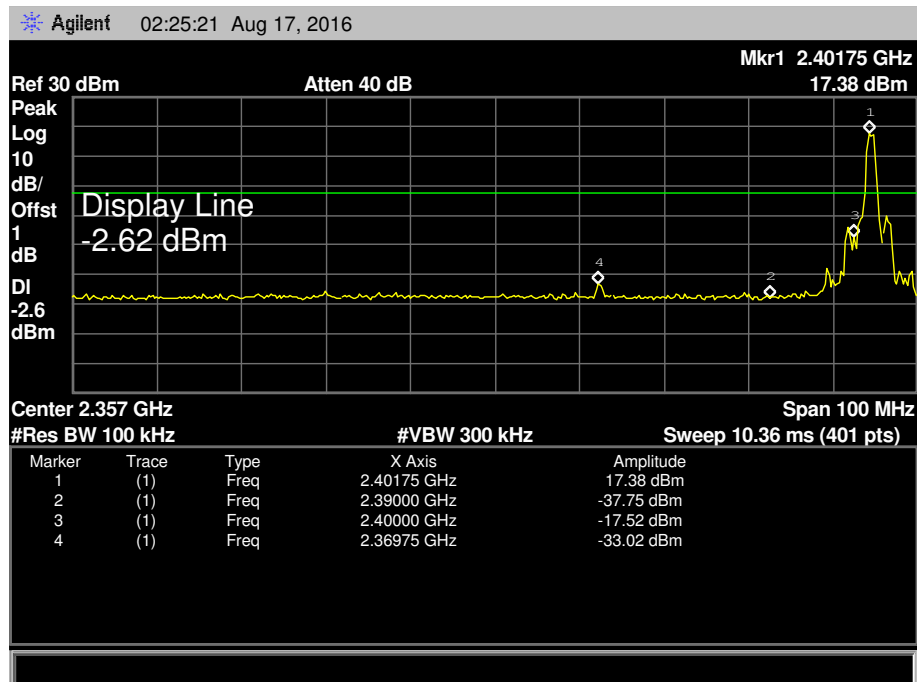


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1	X	2473.800	108.00	1.13	109.13	Fundamental Frequency		peak
2	*	2474.000	107.26	1.13	108.39	Fundamental Frequency		AVG
3		2483.500	57.54	1.17	58.71	74.00	-15.29	peak
4		2483.500	45.21	1.17	46.38	54.00	-7.62	AVG
5		2506.000	55.48	1.27	56.75	74.00	-17.25	peak
6		2506.000	47.43	1.27	48.70	54.00	-5.30	AVG

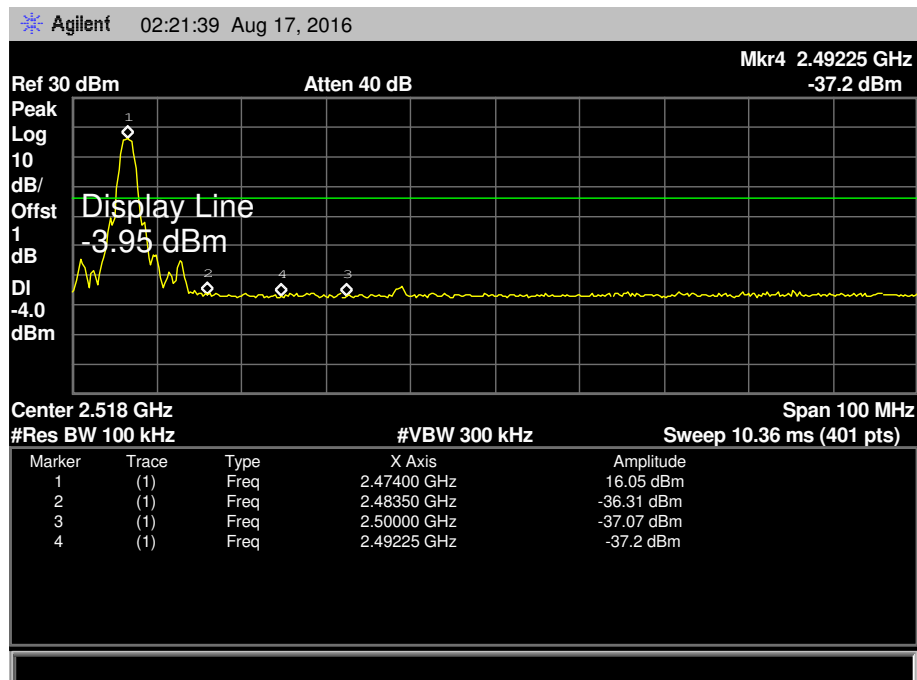
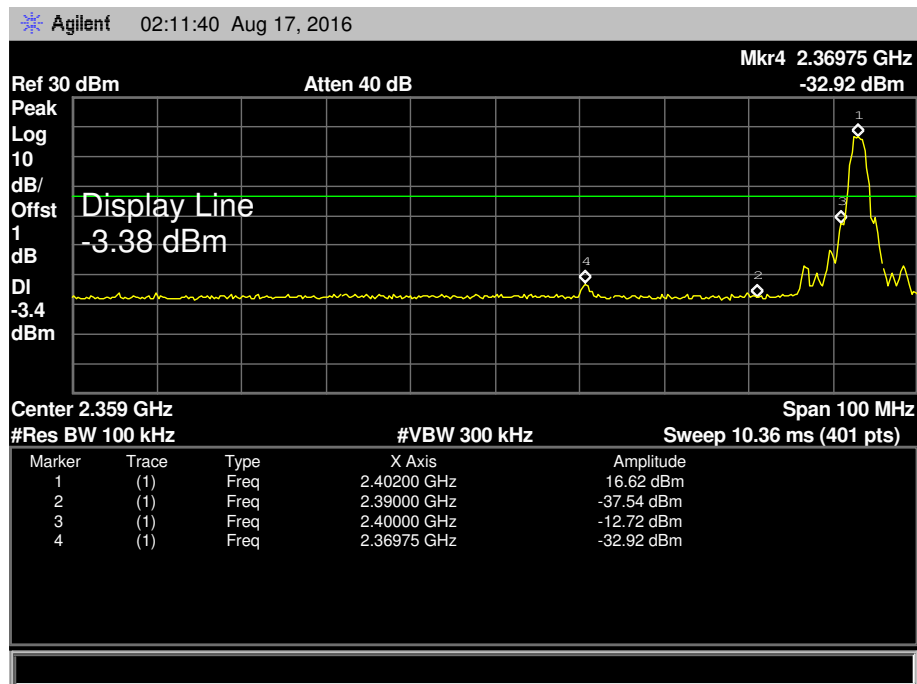
Emission Level= Read Level+ Correct Factor

(2) Conducted Test

EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Test Mode:	TX GFSK(1Mbps) Mode 2402MHz / TX Mode 2474MHz		
Remark:	The EUT is programed in continuously transmitting mode		



EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Test Mode:	TX GFSK(2Mbps) Mode 2402MHz / TX Mode 2474MHz		
Remark:	The EUT is programed in continuously transmitting mode		



7. Bandwidth Test

7.1 Test Standard and Limit

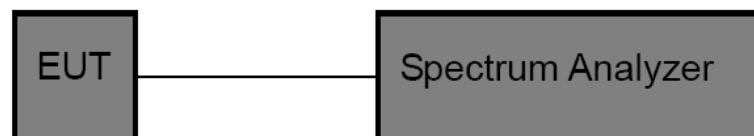
7.1.1 Test Standard

FCC Part 15.247 (a)(2)

7.1.2 Test Limit

FCC Part 15 Subpart C(15.247)/RSS-210		
Test Item	Limit	Frequency Range(MHz)
Bandwidth	≥ 500 KHz (6dB bandwidth)	2400~2483.5

7.2 Test Setup



7.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) The bandwidth is measured at an amplitude level reduced 6dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst –case (i.e the widest) bandwidth.
- (3) Measure the channel separation the spectrum analyzer was set to Resolution Bandwidth:100 kHz, and Video Bandwidth:300 kHz, Detector: Peak, Sweep Time set auto.

7.4 EUT Operating Condition

The EUT was set to continuously transmitting in each mode and low, middle and high channel for the test.

7.5 Test Data

EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Test Mode:	TX GFSK(1Mbps) Mode		
Channel frequency (MHz)	6dB Bandwidth (kHz)	99% Bandwidth (kHz)	Limit (kHz)
2402	715.494	1094.6	≥500
2439	730.609	1093.8	
2474	722.694	1089.8	

TX GFSK(1Mbps) Mode

2402 MHz

Agilent02:29:41 Aug 17, 2016

Ref 30 dBm

Atten 40 dB

#Peak

Log

10

dB/

Offst

1

dB

RBW

100.0000000 kHz

Center 2.402 GHz

#Res BW 100 kHz

#VBW 300 kHz

Span 3 MHz

Sweep 5 ms (401 pts)

Occupied Bandwidth

1.0946 MHz

Occ BW % Pwr

99.00 %

x dB

-6.00 dB

Transmit Freq Error

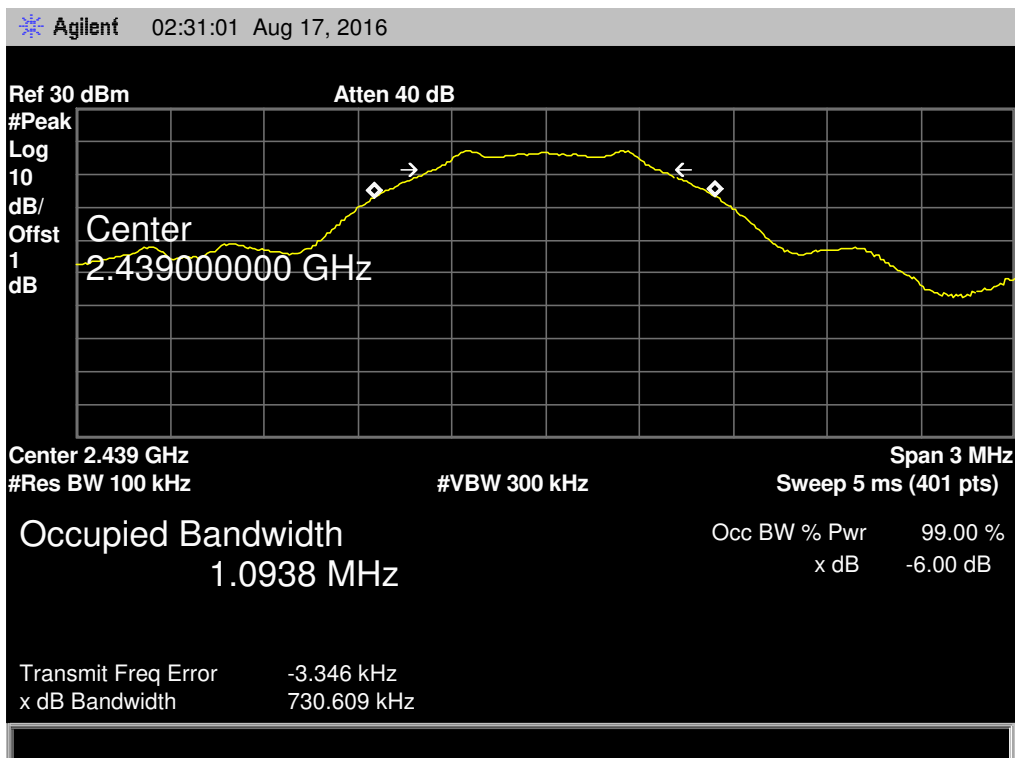
-4.587 kHz

x dB Bandwidth

715.494 kHz

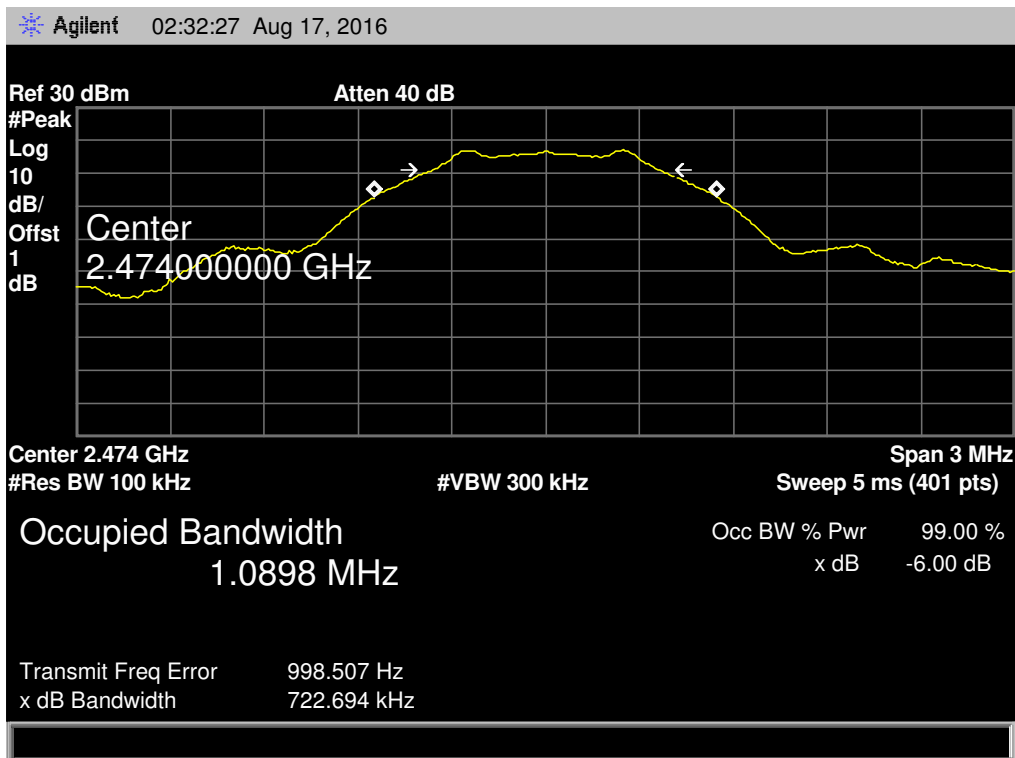
TX GFSK(1Mbps) Mode

2439 MHz



TX GFSK(1Mbps) Mode

2474 MHz



EUT:	QuickVu Digital Backup Camera	Model:	200
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 12V		
Test Mode:	TX GFSK(2Mbps) Mode		
Channel frequency (MHz)	6dB Bandwidth (KHz)	99% Bandwidth (KHz)	Limit (KHz)
2402	1235.0	2111.6	>=500
2439	1320.0	2110.3	
2474	1340.0	2107.6	
TX GFSK(2Mbps) Mode			
2402 MHz			

Agilent02:37:07 Aug 17, 2016

Ref 30 dBm

Atten 40 dB

#Peak

Log

10

dB/

Offst

1

dB

Center

2.402000000 GHz

Center 2.402 GHz

#Res BW 100 kHz

#VBW 300 kHz

Span 3 MHz

Sweep 5 ms (401 pts)

Occupied Bandwidth

2.1116 MHz

Occ BW % Pwr

99.00 %

x dB

-6.00 dB

Transmit Freq Error

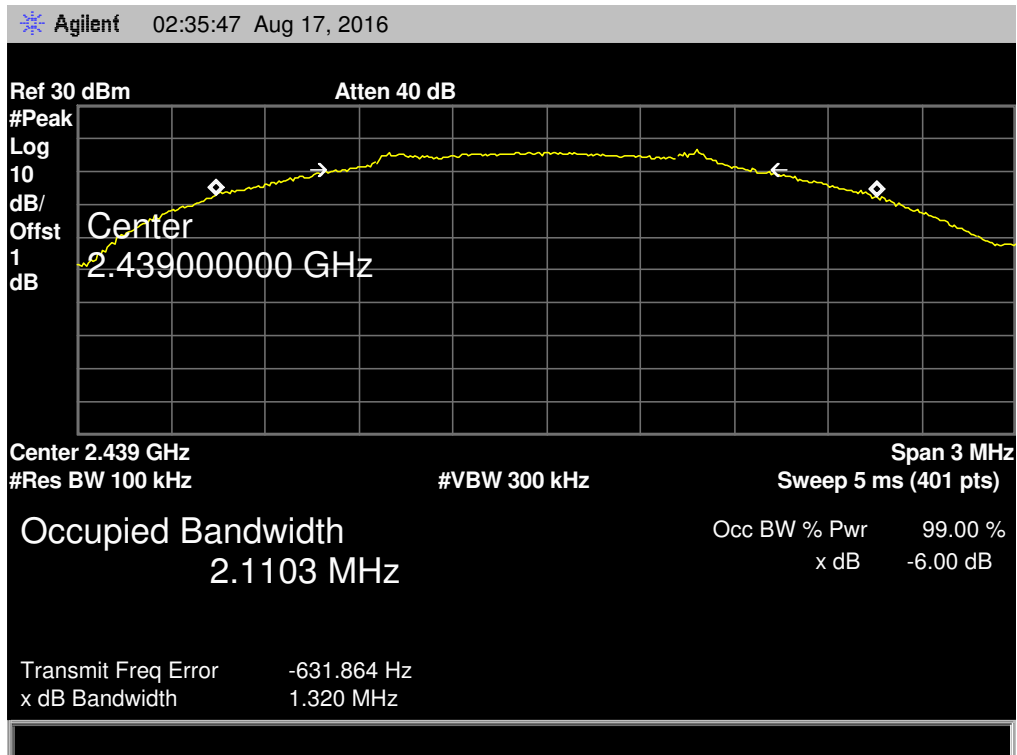
-269.322 Hz

x dB Bandwidth

1.235 MHz

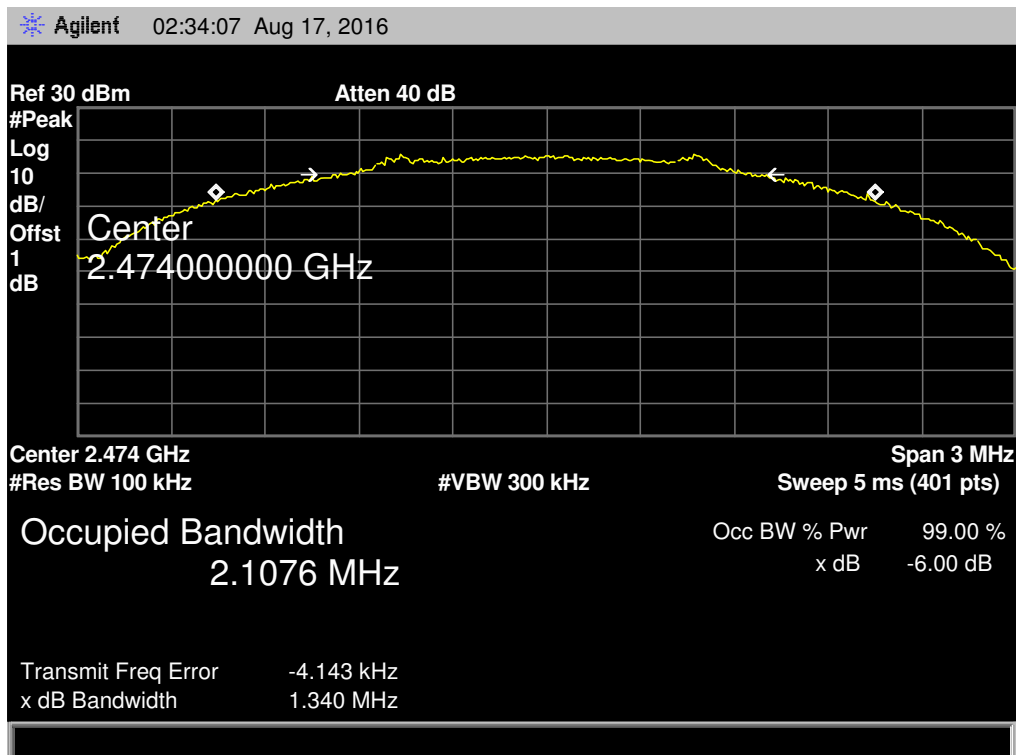
TX GFSK(2Mbps) Mode

2439 MHz



TX GFSK(2Mbps) Mode

2474 MHz



8. Peak Output Power Test

8.1 Test Standard and Limit

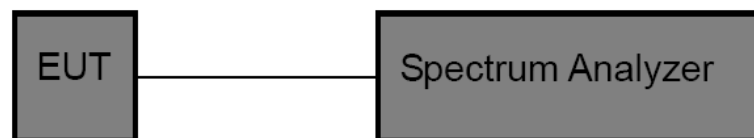
8.1.1 Test Standard

FCC Part 15.247 (b)

8.1.2 Test Limit

FCC Part 15 Subpart C(15.247)/RSS-210		
Test Item	Limit	Frequency Range(MHz)
Peak Output Power	1 Watt or 30 dBm	2400~2483.5

8.2 Test Setup



8.3 Test Procedure

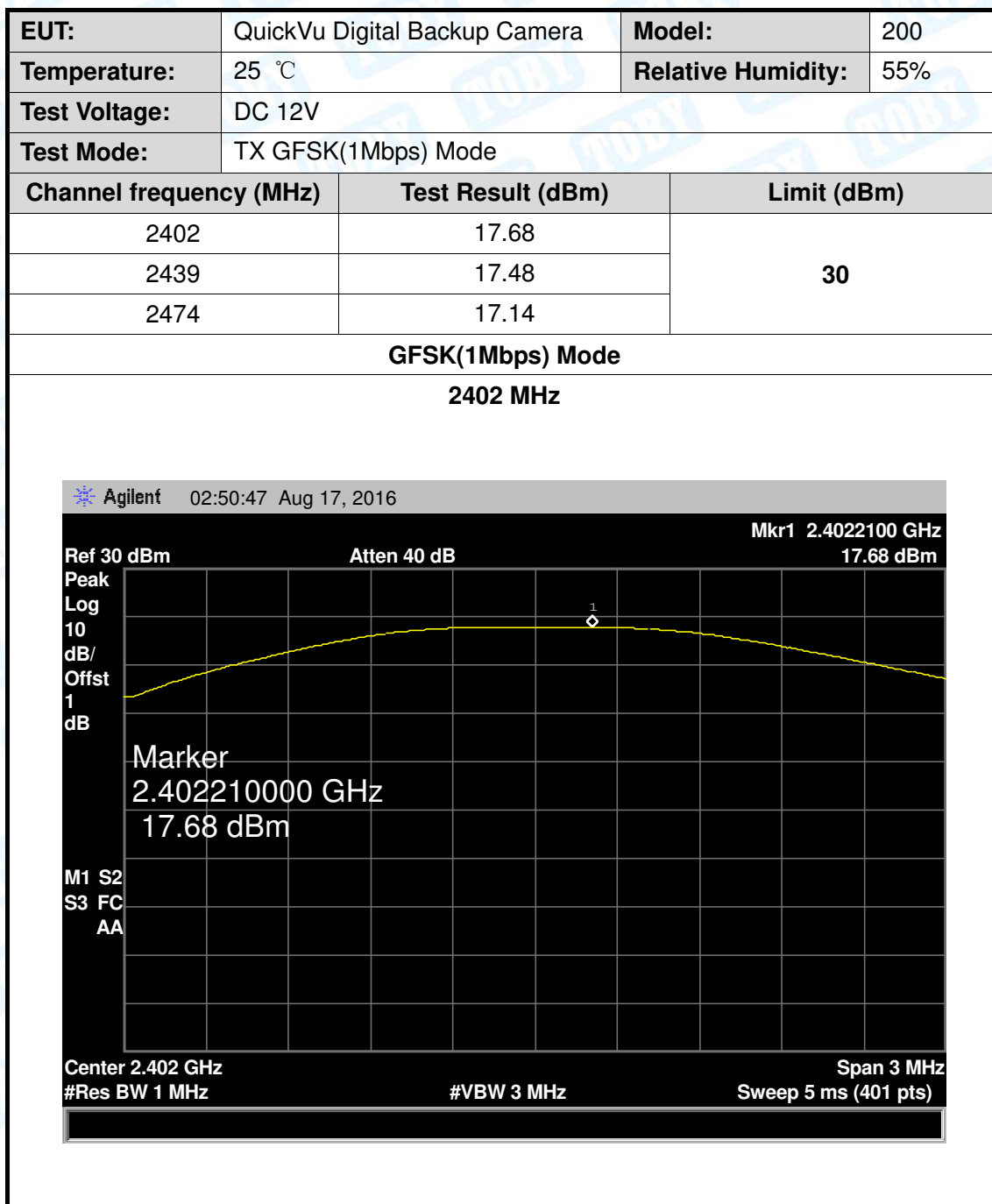
This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

- Set the RBW $\geq$ DTS bandwidth.
- Set VBW $\geq$ 3*RBW.
- Set span $\geq$ 3*RBW
- Sweep time = auto couple.
- Detector = peak.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use peak marker function to determine the peak amplitude level.

8.4 EUT Operating Condition

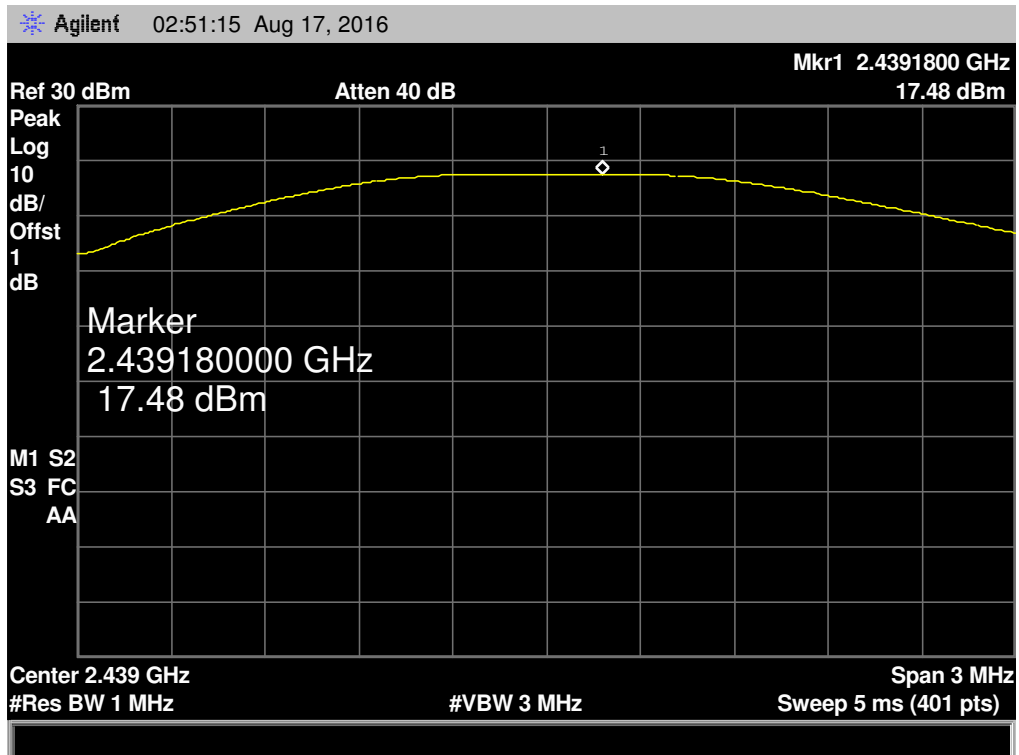
The EUT was set to continuously transmitting in the max power during the test.

8.5 Test Data



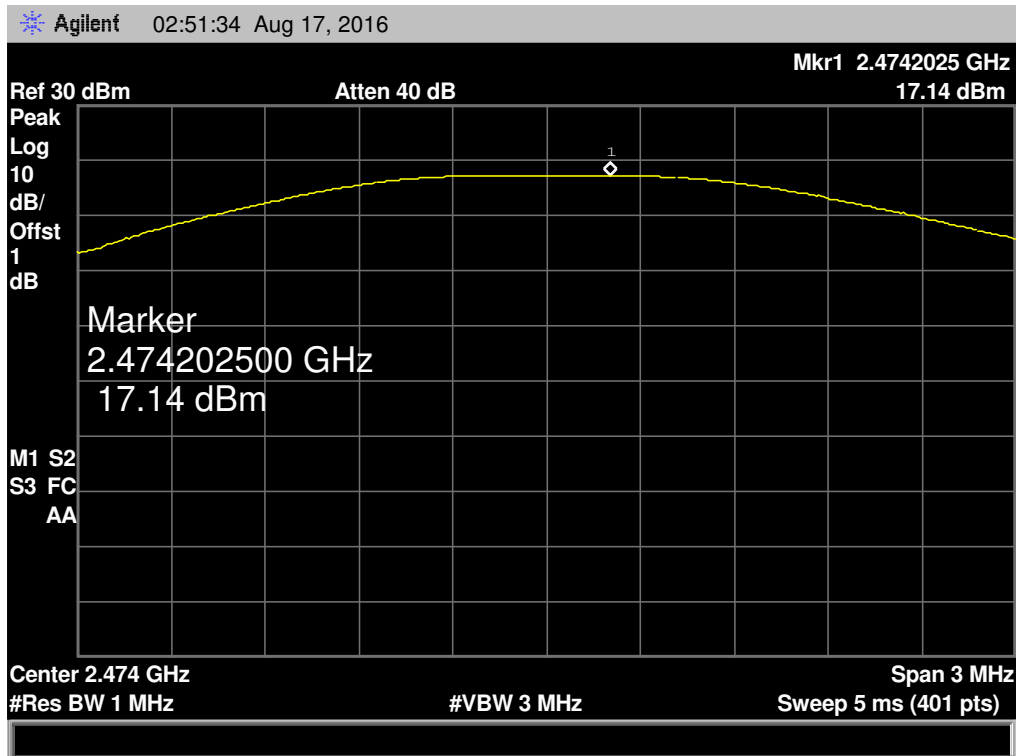
GFSK(1Mbps) Mode

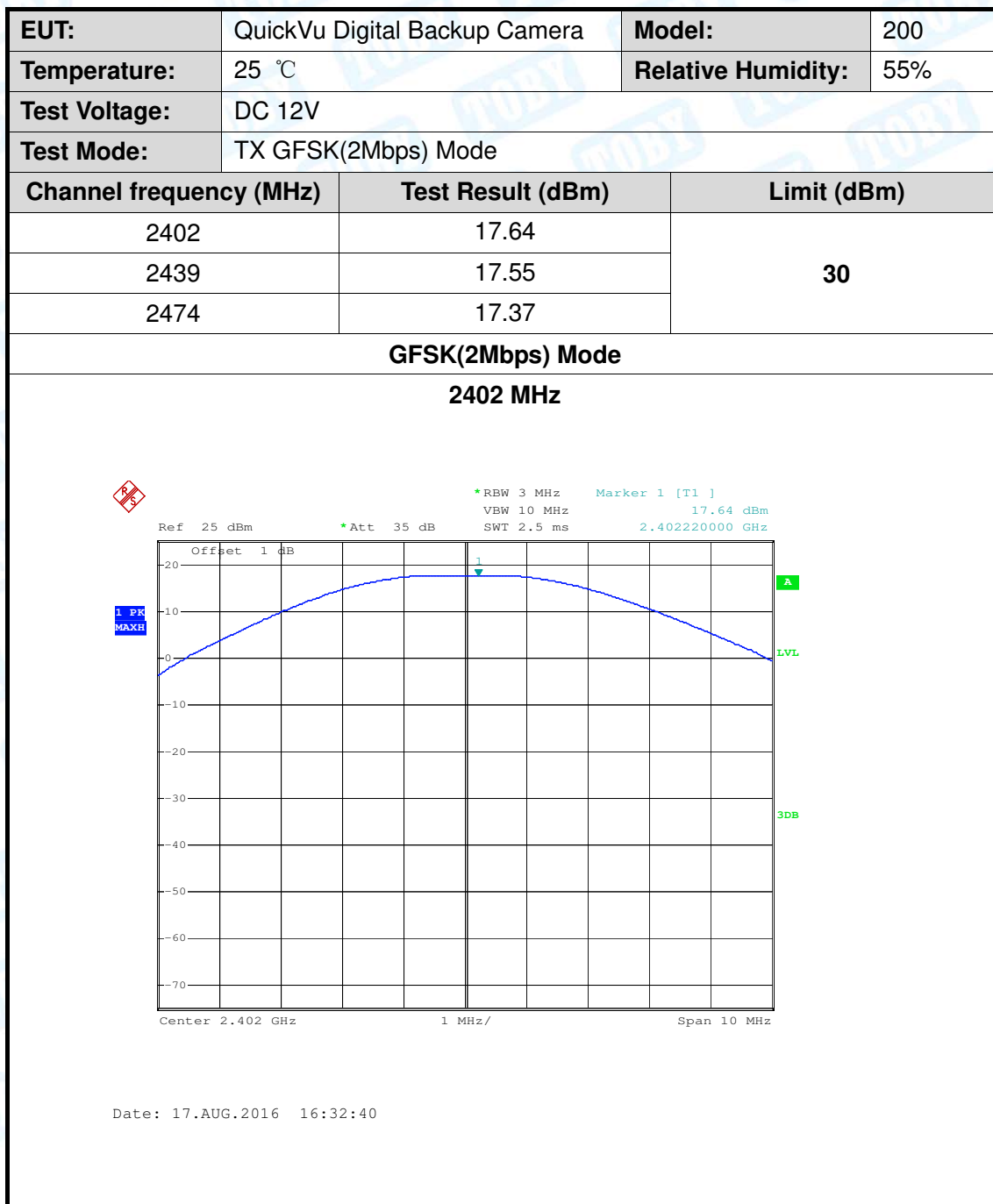
2439 MHz

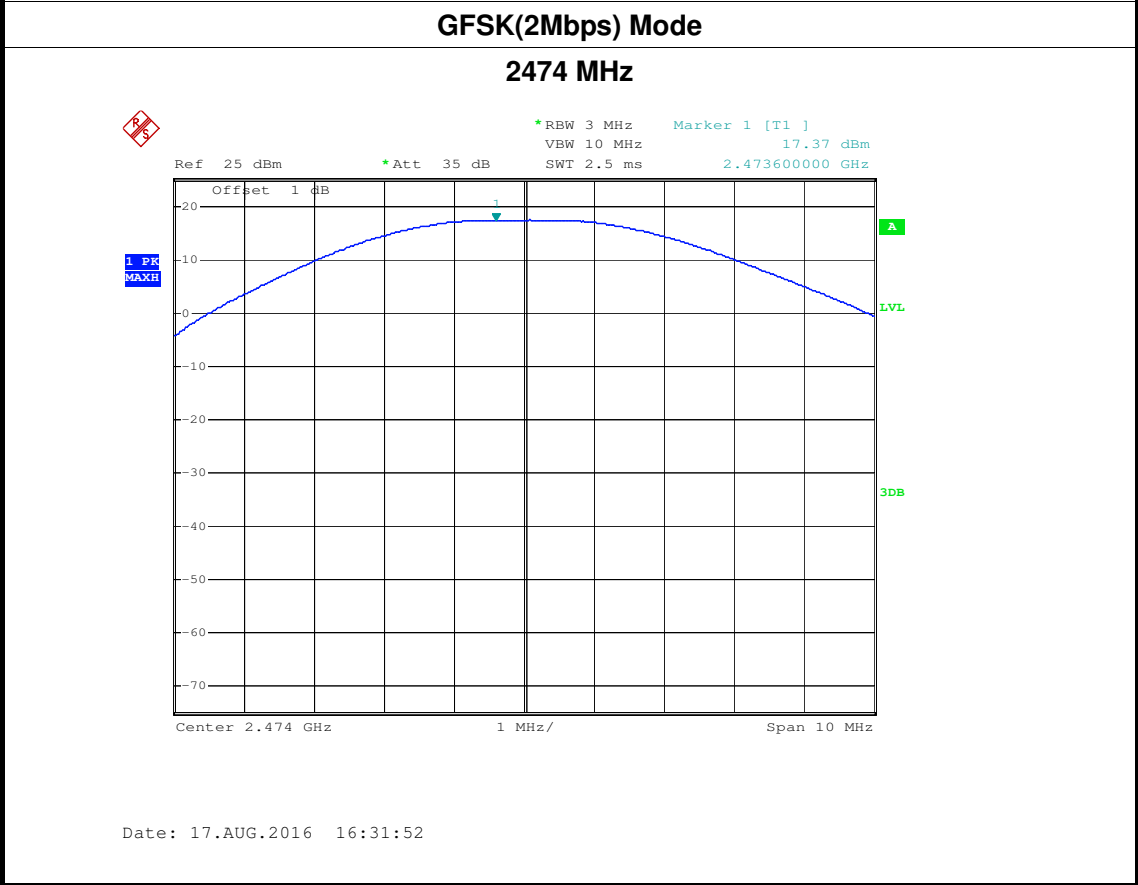
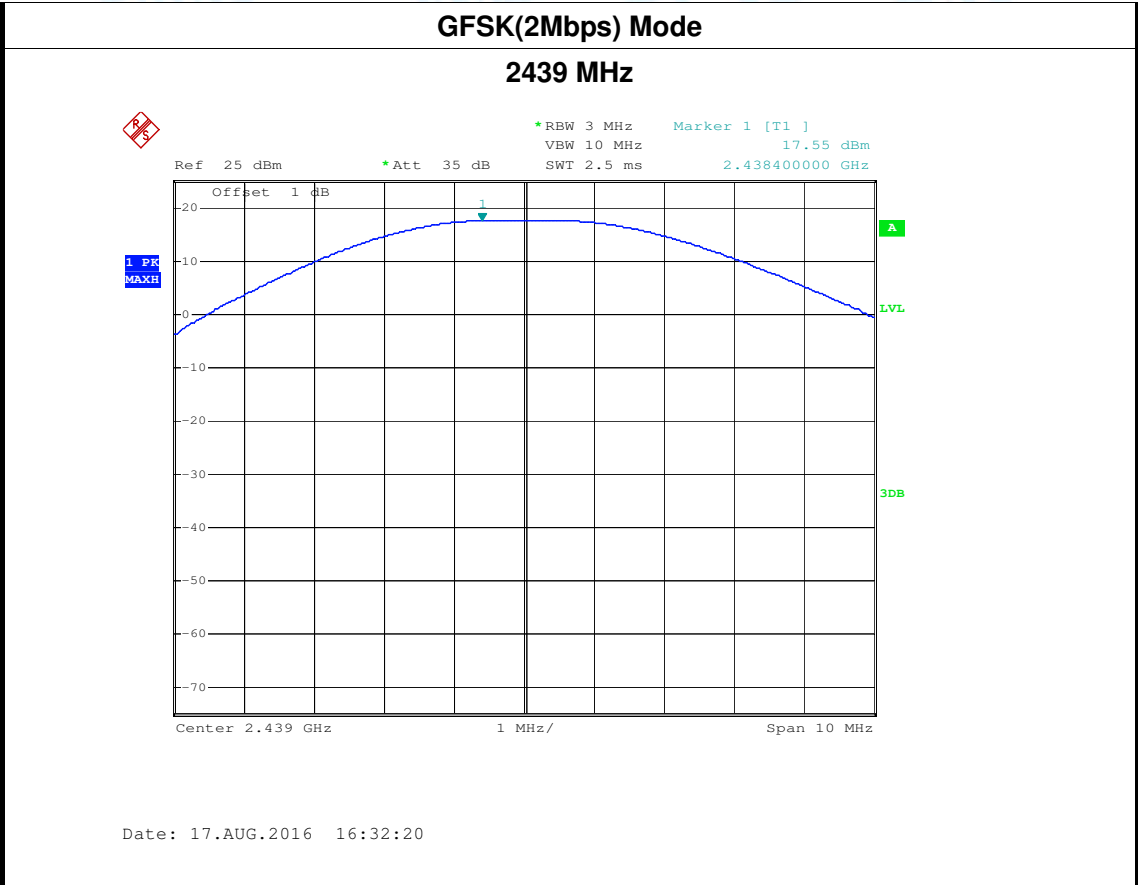


GFSK(1Mbps) Mode

2474 MHz







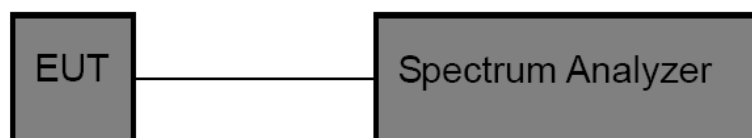
9. Power Spectral Density Test

9.1 Test Standard and Limit

- 9.1.1 Test Standard
FCC Part 15.247 (e)
- 9.1.2 Test Limit

FCC Part 15 Subpart C(15.247)		
Test Item	Limit	Frequency Range(MHz)
Power Spectral Density	8dBm(in any 3 kHz)	2400~2483.5

9.2 Test Setup



9.3 Test Procedure

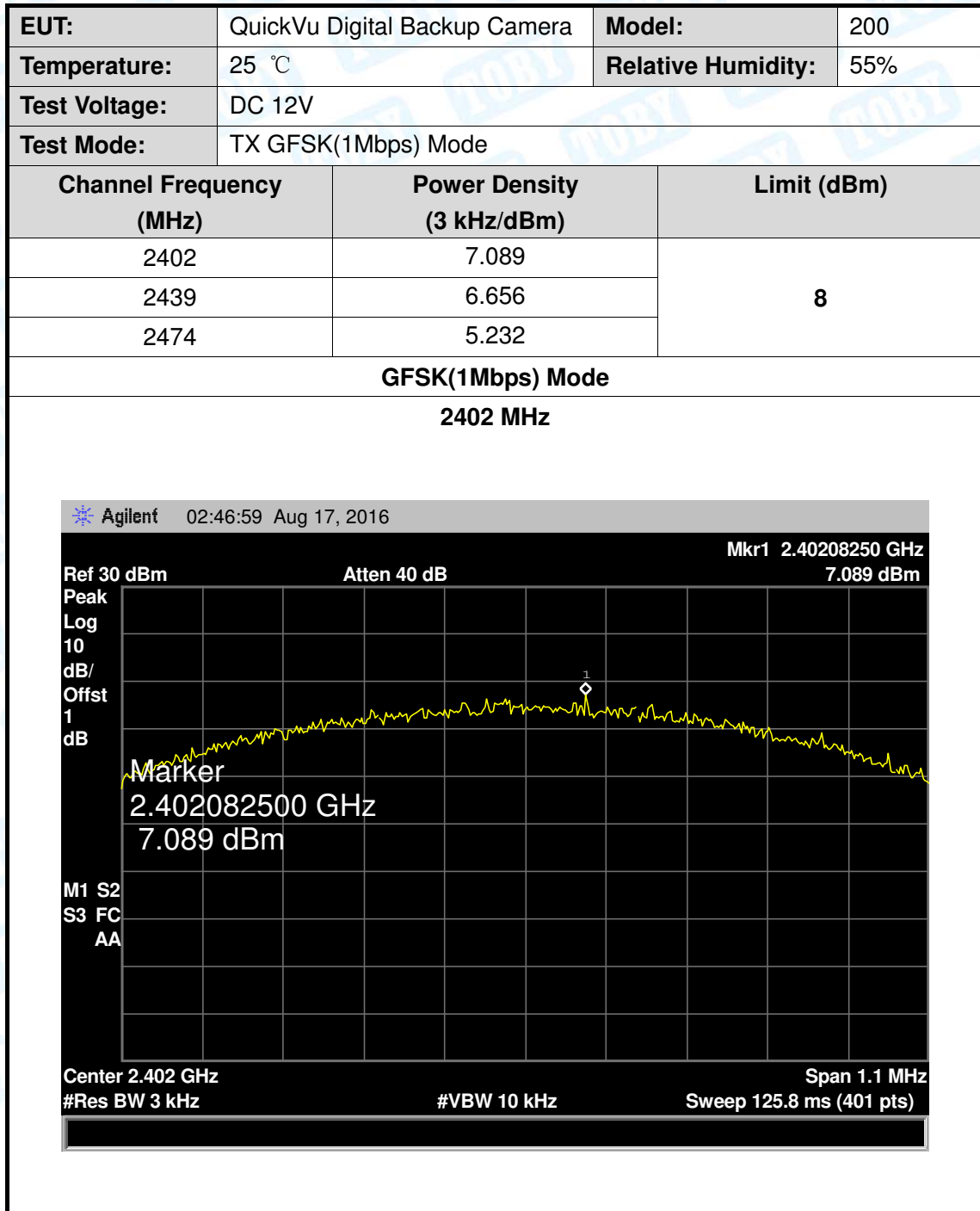
The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement according to section 10.2 of KDB 558074 D01 DTS Meas Guidance v03r05.

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Set analyser center frequency to DTS channel center frequency.
- (3) Set the span to 1.5 times the DTS bandwidth.
- (4) Set the RBW to: 3 kHz
- (5) Set the VBW to: 10 kHz
- (6) Detector: peak
- (7) Sweep time: auto
- (8) Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

9.4 EUT Operating Condition

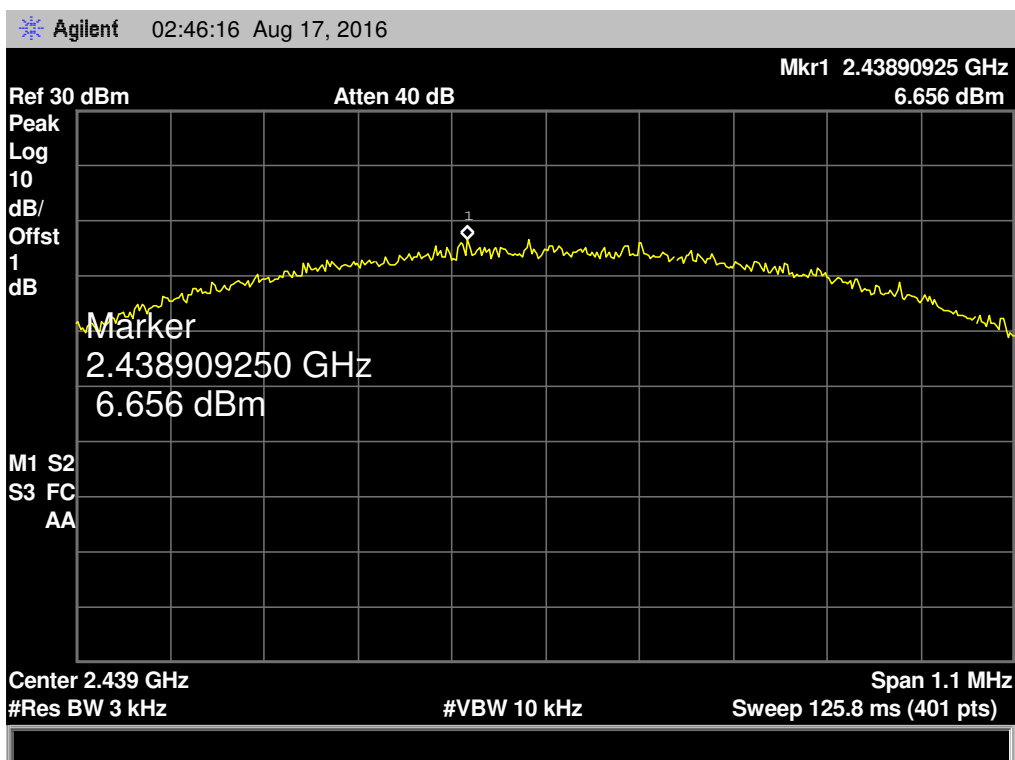
The EUT was set to continuously transmitting in each mode and low, middle and high channel for the test.

9.5 Test Data



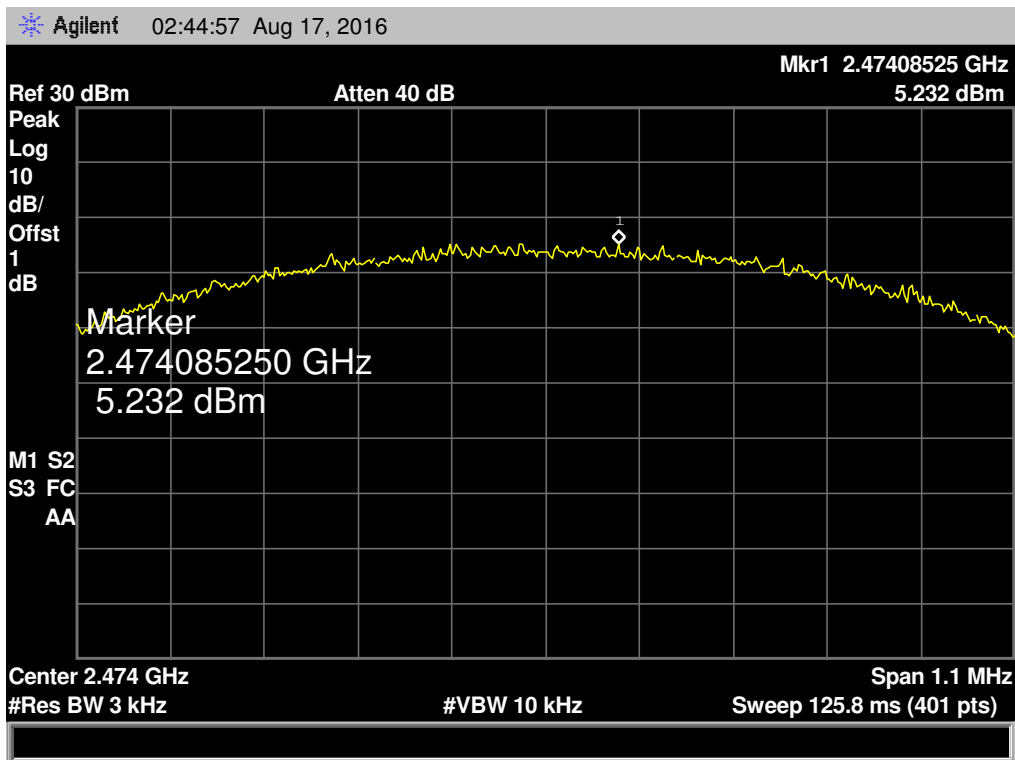
GFSK(1Mbps) Mode

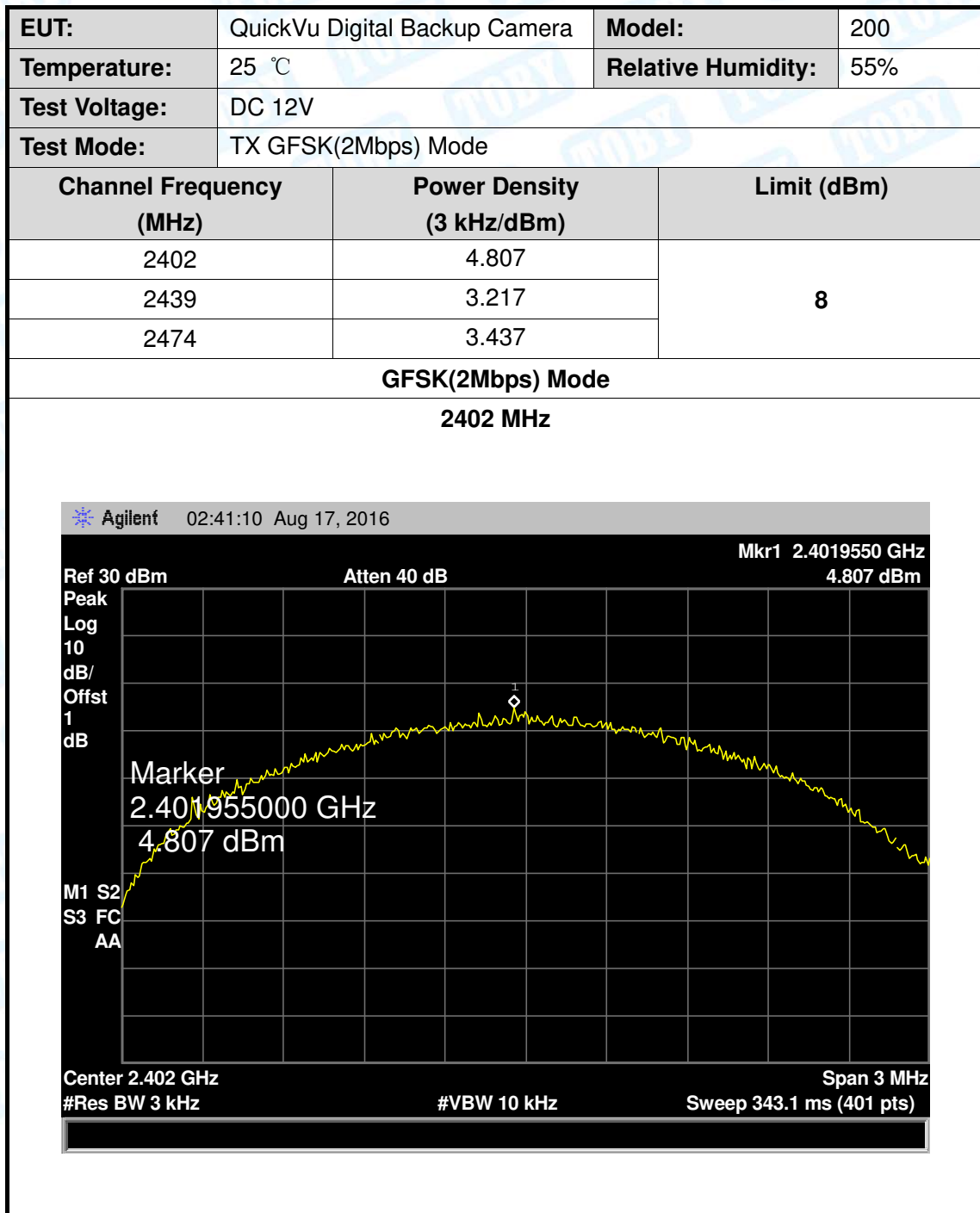
2439 MHz



GFSK(1Mbps) Mode

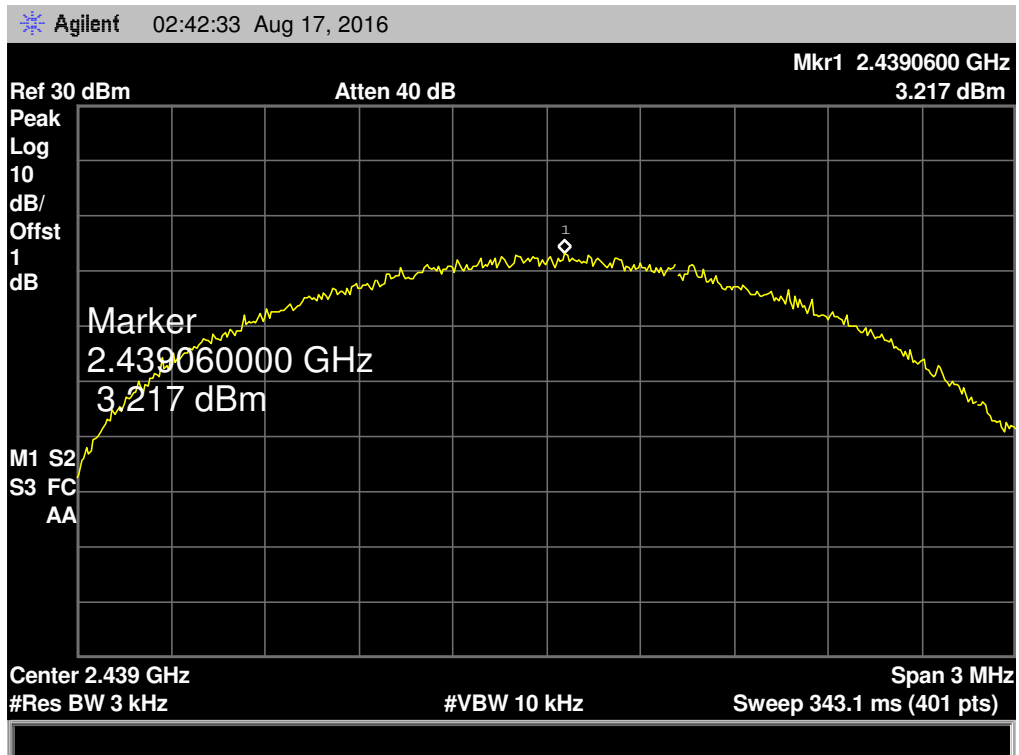
2474 MHz





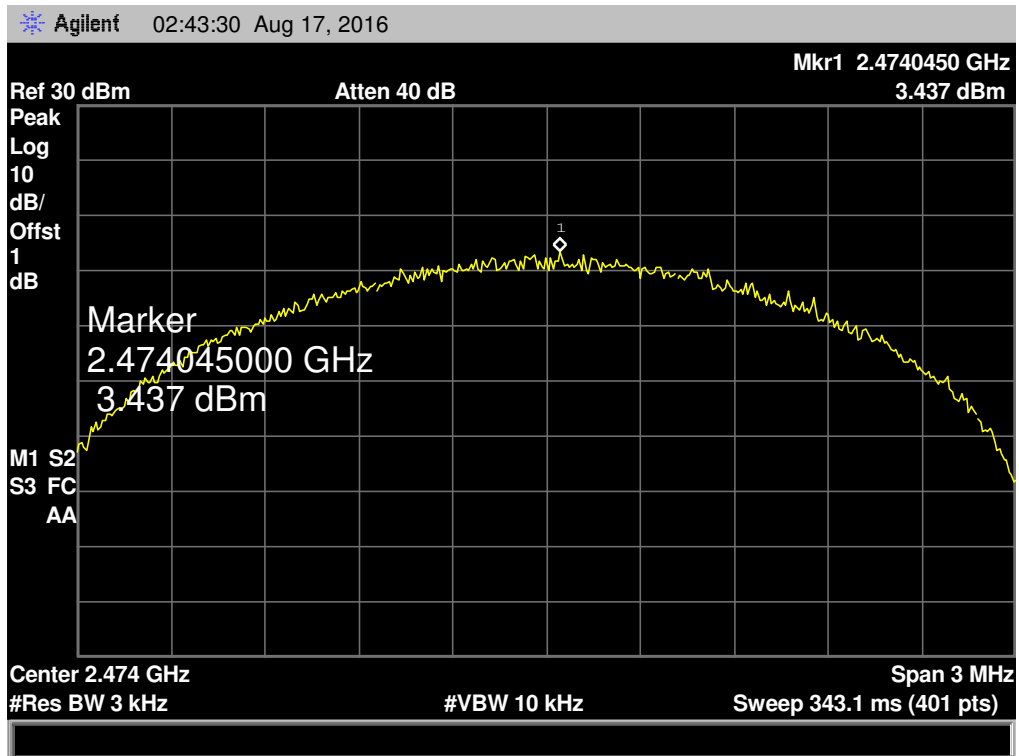
GFSK(2Mbps) Mode

2439 MHz



GFSK(2Mbps) Mode

2474 MHz



10. Antenna Requirement

10.1 Standard Requirement

10.1.1 Standard

FCC Part 15.203

10.1.2 Requirement

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

10.2 Antenna Connected Construction

The directional gains of the antenna used for transmitting is 3.3 dBi, and the antenna de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

Result

The EUT antenna is a PCB Antenna. It complies with the standard requirement.

Antenna Type
☒ Permanent attached antenna
☐ Unique connector antenna
☐ Professional installation antenna

-----END OF REPORT-----