

FCC Radio Test Report

FCC ID: 2ANHTWKJJ-V4

Report No. : TB-FCC155603
Applicant : Jiaxing Wallstech Import & Export Co., Ltd.
Equipment Under Test (EUT)
EUT Name : Control Box
Model No. : WKJJ-V4
Serial Model No. : WKJJ-V1, WKJJ-V2, WKJJ-V3
Brand Name : N/A
Receipt Date : 2017-06-18
Test Date : 2017-06-19 to 2017-06-27
Issue Date : 2017-06-28
Standards : FCC Part 15, Subpart C (15.249: 2016)
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 requirements

Test/Witness Engineer : WAN SU

Approved & Authorized :

Long Lai



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	:	Jiaxing Wallstech Import & Export Co., Ltd.
Address	:	#5, No. 1 building, Lusenbao, Paris City, East Zhonghuan Road, Jiaxing, Zhejiang, China
Manufacturer	:	Jiaxing Wallstech Import & Export Co., Ltd.
Address	:	#5, No. 1 building, Lusenbao, Paris City, East Zhonghuan Road, Jiaxing, Zhejiang, China

1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	Control Box
Models No.	:	WKJJ-V4, WKJJ-V1, WKJJ-V2, WKJJ-V3
Model Difference	:	All models are identical in the same PCB layout interior structure and electrical circuits, The only difference is WKJJ-V1 control one motor, WKJJ-V2 control two motor, WKJJ-V3 control three motor, WKJJ-V4 control four motor.
Product Description	:	Operation Frequency: 2410~2475.6829 MHz
		Number of Channels: 82Channels(See Note 2)
		Out Power: 96.24dBuV/m@3m Peak 82.36dBuV/m@3m Avg
		Antenna Gain: 0dBi PCB Antenna
		Modulation Type: FSK
Power Supply	:	DC Voltage supplied by AC/DC Adapter
Power Rating	:	AC/DC Adapter (ZF120A-1208000): Input: AC 100~240V, 50/60Hz, 2.0A Output: DC 12V, 8.0A
Connecting I/O Port(S)	:	Please refer to the User's Manual

Note:

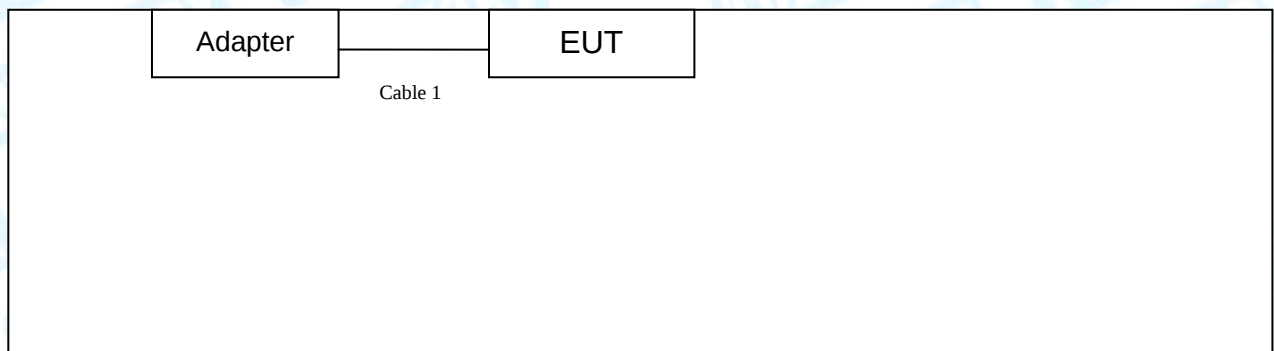
- (1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- (2) Channel List:

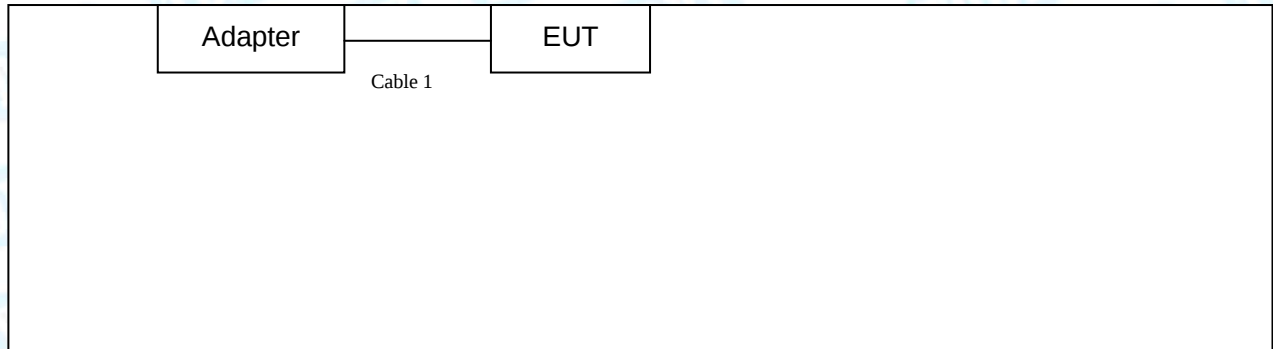
Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2410	28	2432.7052	56	2455.4104
01	2410.8109	29	2433.5161	57	2456.2213

02	2411.6218	30	2434.3270	58	2457.0322
03	2412.4327	31	2435.1379	59	2457.8431
04	2413.2436	32	2435.9488	60	2458.6540
05	2414.0545	33	2436.7597	61	2459.4649
06	2414.8654	34	2437.5706	62	2460.2758
07	2415.6763	35	2438.3815	63	2461.0867
08	2416.4872	36	2439.1924	64	2461.8976
09	2417.2981	37	2440.0033	65	2462.7085
10	2418.1090	38	2440.8142	66	2463.5194
11	2418.9199	39	2441.6251	67	2464.3303
12	2419.7308	40	2442.4360	68	2465.1412
13	2420.5417	41	2443.2469	69	2465.9521
14	2421.3526	42	2444.0578	70	2466.7630
15	2422.1635	43	2444.8687	71	2467.5739
16	2422.9744	44	2445.6796	72	2468.3848
17	2423.7853	45	2446.4905	73	2469.1957
18	2424.5962	46	2447.3014	74	2470.0066
19	2425.4071	47	2448.1123	75	2470.8175
20	2426.2180	48	2448.9232	76	2471.6284
21	2427.0289	49	2449.7341	77	2472.4393
22	2427.8398	50	2450.5450	78	2473.2502
23	2428.6507	51	2451.3559	79	2474.0611
24	2429.4616	52	2452.1668	80	2474.8720
25	2430.2725	53	2452.9777	81	2475.6829
26	2431.0834	54	2453.7886		
27	2431.8943	55	2454.5995		

1.3 Block Diagram Showing the Configuration of System Tested

Charging + TX Mode



TX Mode**1.4 Description of Support Units**

Equipment Information				
Name	Model	FCC ID/VOC	Manufacturer	Used “√”
Cable Information				
Number	Shielded Type	Ferrite Core	Length	Note
Cable 1	YES	YES	1.0M	

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	N/A

For Radiated Test	
Final Test Mode	Description
Mode 2	TX Mode(CH00/CH41/CH81)

Note:

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.

- (1) According to ANSI C63.10 standards, the measurements are performed at the highest, middle, lowest available channels.
- (2) During the testing procedure, the continuously transmitting with the maximum power mode was programmed by the customer.
- (3) The EUT is considered a portable unit; it was pre-tested on the positioned of each 3 axis, X-plane, Y-plane and Z-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 RF mode.

Product SW/HW Version :	N/A		
Radio SW/HW Version:	N/A		
Test Software Version	N/A		
Frequency	2410 MHz	2443.2469MHz	2475.6829MHz
FSK	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(15.249)			
Standard Section	Test Item	Judgment	Remark
15.203	Antenna Requirement	PASS	N/A
15.205	Restricted Bands	PASS	N/A
15.207	AC Power Conducted Emission	PASS	N/A
15.249 &15.209	Radiated Spurious Emission	PASS	N/A
15.215(C)	20dB Bandwidth	PASS	N/A
Note: 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. 25, 2017	Mar. 24, 2018
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar. 25, 2017	Mar. 24, 2018
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 25, 2017	Mar. 24, 2018
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar. 25, 2017	Mar. 24, 2018
Loop Antenna	Laplace instrument	RF300	0701	Mar. 25, 2017	Mar. 24, 2018
Pre-amplifier	Sonoma	310N	185903	Mar. 24, 2017	Mar. 23, 2018
Pre-amplifier	HP	8449B	3008A00849	Mar. 29, 2017	Mar. 28, 2018
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 29, 2017	Mar. 28, 2018
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	100010/007	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

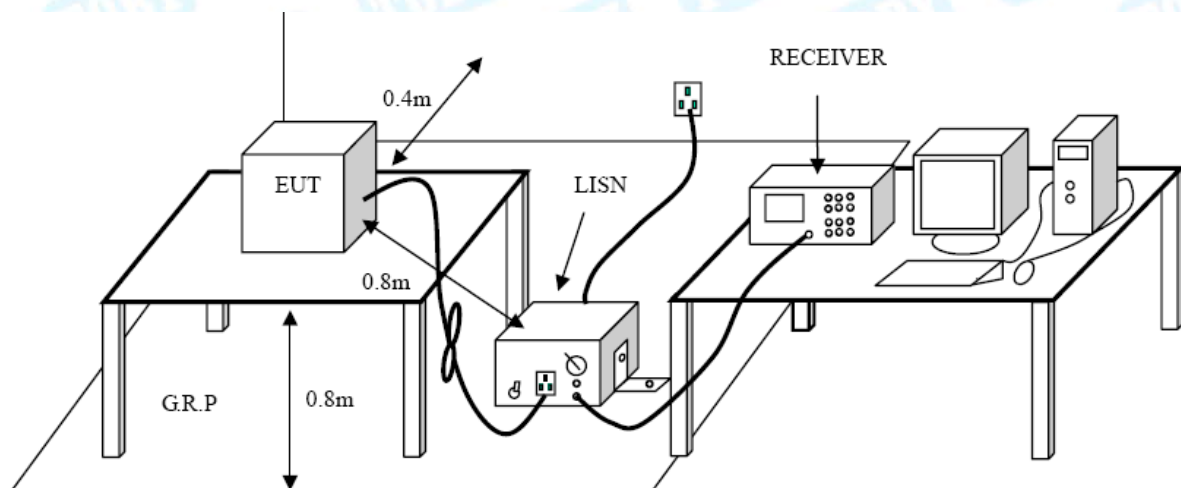
Notes:

(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 is 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.

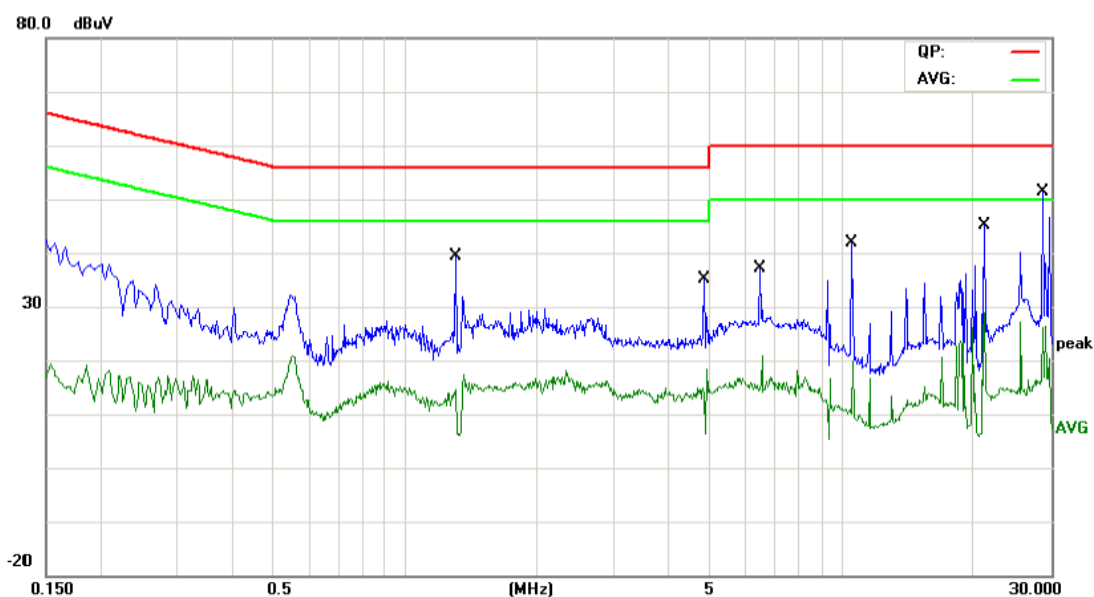
4.4 EUT Operating Mode

Please refer to the description of test mode.

4.5 Test Data

Please see the next page.

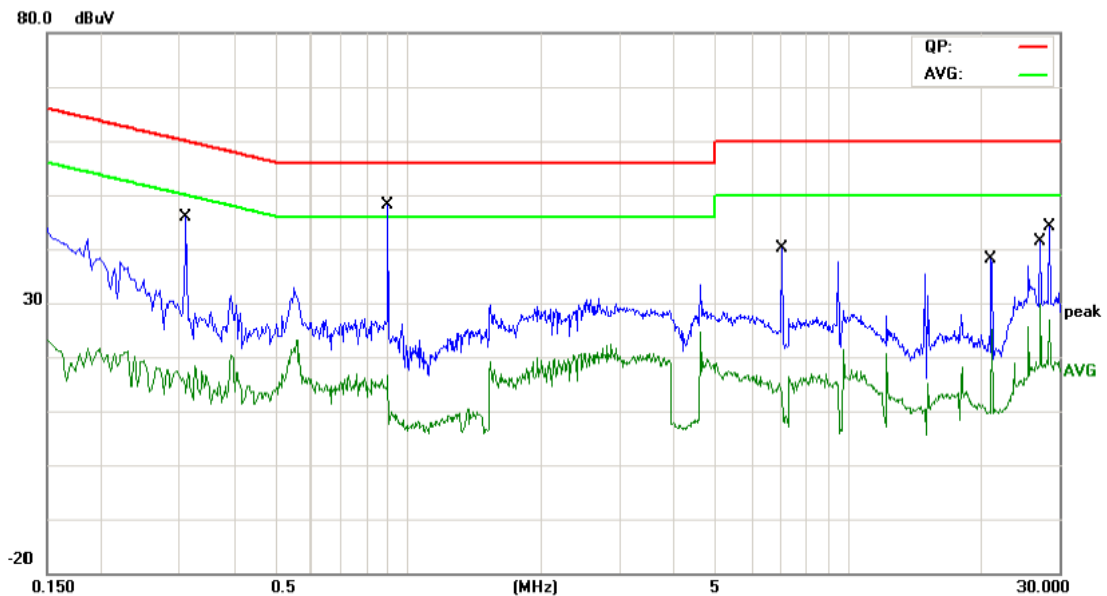
EUT:	Control Box	Model Name :	WKJJ-V4
Temperature:	25°C	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		
Terminal:	Line		
Test Mode:	Normal Mode		
Remark:	Only worse case is reported		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		1.2980	11.76	9.60	21.36	56.00	-34.64	QP
2		1.2980	0.64	9.60	10.24	46.00	-35.76	AVG
3		4.8260	9.75	9.73	19.48	56.00	-36.52	QP
4	*	4.8260	2.95	9.73	12.68	46.00	-33.32	AVG
5		10.5380	5.59	10.10	15.69	60.00	-44.31	QP
6		10.5380	-0.76	10.10	9.34	50.00	-40.66	AVG
7		21.2260	10.01	10.56	20.57	60.00	-39.43	QP
8		21.2260	2.25	10.56	12.81	50.00	-37.19	AVG
9		28.6860	12.69	10.79	23.48	60.00	-36.52	QP
10		28.6860	5.55	10.79	16.34	50.00	-33.66	AVG
11		6.4620	12.03	9.83	21.86	60.00	-38.14	QP
12		6.4620	3.95	9.83	13.78	50.00	-36.22	AVG

Emission Level= Read Level+ Correct Factor

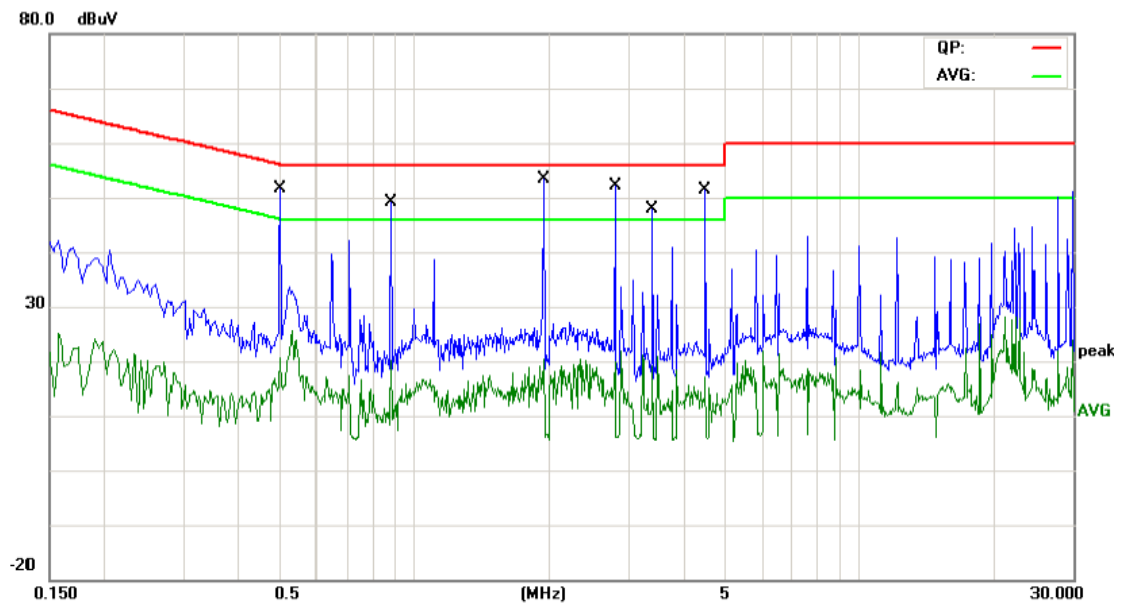
EUT:	Control Box	Model Name :	WKJJ-V4
Temperature:	25°C	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		
Terminal:	Neutral		
Test Mode:	Normal Mode		
Remark:	Only worse case is reported		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.3100	17.00	9.57	26.57	59.97	-33.40	QP
2		0.3100	5.08	9.57	14.65	49.97	-35.32	AVG
3	*	0.8980	13.99	9.59	23.58	56.00	-32.42	QP
4		0.8980	3.36	9.59	12.95	46.00	-33.05	AVG
5		7.0260	11.31	10.29	21.60	60.00	-38.40	QP
6		7.0260	0.78	10.29	11.07	50.00	-38.93	AVG
7		21.1020	10.86	10.66	21.52	60.00	-38.48	QP
8		21.1020	-1.59	10.66	9.07	50.00	-40.93	AVG
9		27.0380	15.47	10.75	26.22	60.00	-33.78	QP
10		27.0380	5.80	10.75	16.55	50.00	-33.45	AVG
11		28.5580	16.20	10.79	26.99	60.00	-33.01	QP
12		28.5580	6.45	10.79	17.24	50.00	-32.76	AVG

Emission Level= Read Level+ Correct Factor

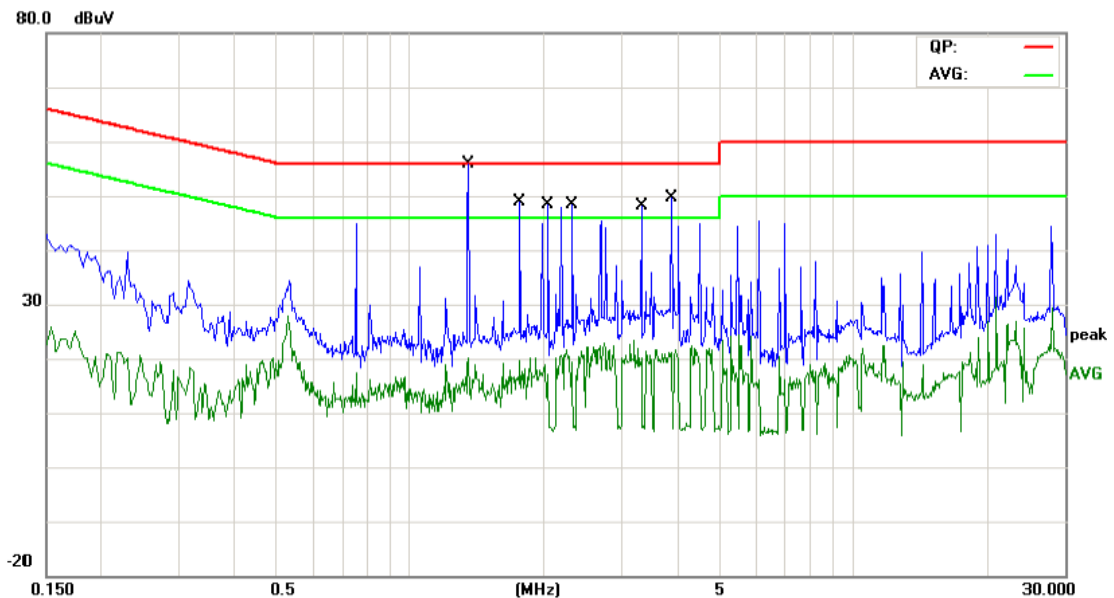
EUT:	Control Box	Model Name :	WKJJ-V4
Temperature:	25°C	Relative Humidity:	55%
Test Voltage:	AC 230V/50 Hz		
Terminal:	Line		
Test Mode:	Normal Mode		
Remark:	Only worse case is reported		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		1.9420	12.54	9.61	22.15	56.00	-33.85	QP
2	*	1.9420	5.27	9.61	14.88	46.00	-31.12	AVG
3		2.7980	10.22	9.65	19.87	56.00	-36.13	QP
4		2.7980	2.60	9.65	12.25	46.00	-33.75	AVG
5		0.4980	12.66	9.58	22.24	56.03	-33.79	QP
6		0.4980	4.81	9.58	14.39	46.03	-31.64	AVG
7		4.4940	8.65	9.81	18.46	56.00	-37.54	QP
8		4.4940	2.21	9.81	12.02	46.00	-33.98	AVG
9		0.8820	9.72	9.59	19.31	56.00	-36.69	QP
10		0.8820	-0.76	9.59	8.83	46.00	-37.17	AVG
11		3.4140	6.75	9.69	16.44	56.00	-39.56	QP
12		3.4140	-0.19	9.69	9.50	46.00	-36.50	AVG

Emission Level= Read Level+ Correct Factor

EUT:	Control Box	Model Name :	WKJJ-V4
Temperature:	25°C	Relative Humidity:	55%
Test Voltage:	AC 230V/50 Hz		
Terminal:	Neutral		
Test Mode:	Normal Mode		
Remark:	Only worse case is reported		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		1.3460	11.30	9.60	20.90	56.00	-35.10	QP
2		1.3460	3.80	9.60	13.40	46.00	-32.60	AVG
3		3.8980	15.96	9.71	25.67	56.00	-30.33	QP
4	*	3.8980	8.25	9.71	17.96	46.00	-28.04	AVG
5		1.7700	12.50	9.61	22.11	56.00	-33.89	QP
6		1.7700	4.30	9.61	13.91	46.00	-32.09	AVG
7		2.3220	12.91	9.63	22.54	56.00	-33.46	QP
8		2.3220	2.63	9.63	12.26	46.00	-33.74	AVG
9		2.0540	12.76	9.61	22.37	56.00	-33.63	QP
10		2.0540	3.91	9.61	13.52	46.00	-32.48	AVG
11		3.3180	14.98	9.68	24.66	56.00	-31.34	QP
12		3.3180	7.63	9.68	17.31	46.00	-28.69	AVG

Emission Level= Read Level+ Correct Factor

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 Limit (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)	Distance Meters (at 3m)	
	Peak	Average
Above 1000	74	54

Note:

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

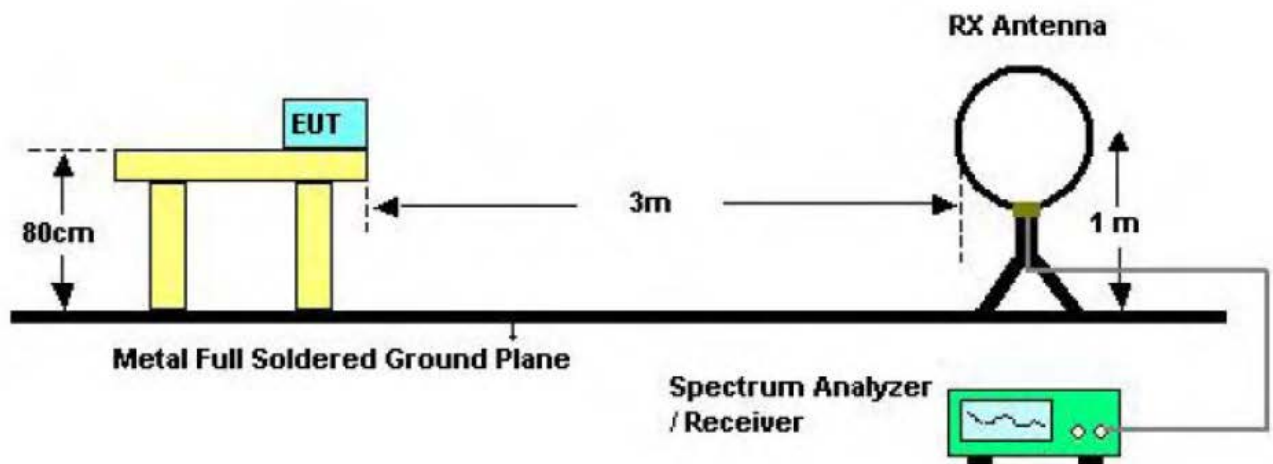
Limits of radiated emission measurement (15.249)

FCC Part 15 (15.249), Subpart C	
Limit	Frequency Range (MHz)
Field strength of fundamental 50000 μ V/m (94 dB μ V/m) @ 3 m	2400~2483.5
Field strength of fundamental 500 μ V/m (94 dB μ V/m) @ 3 m	Above 2483.5

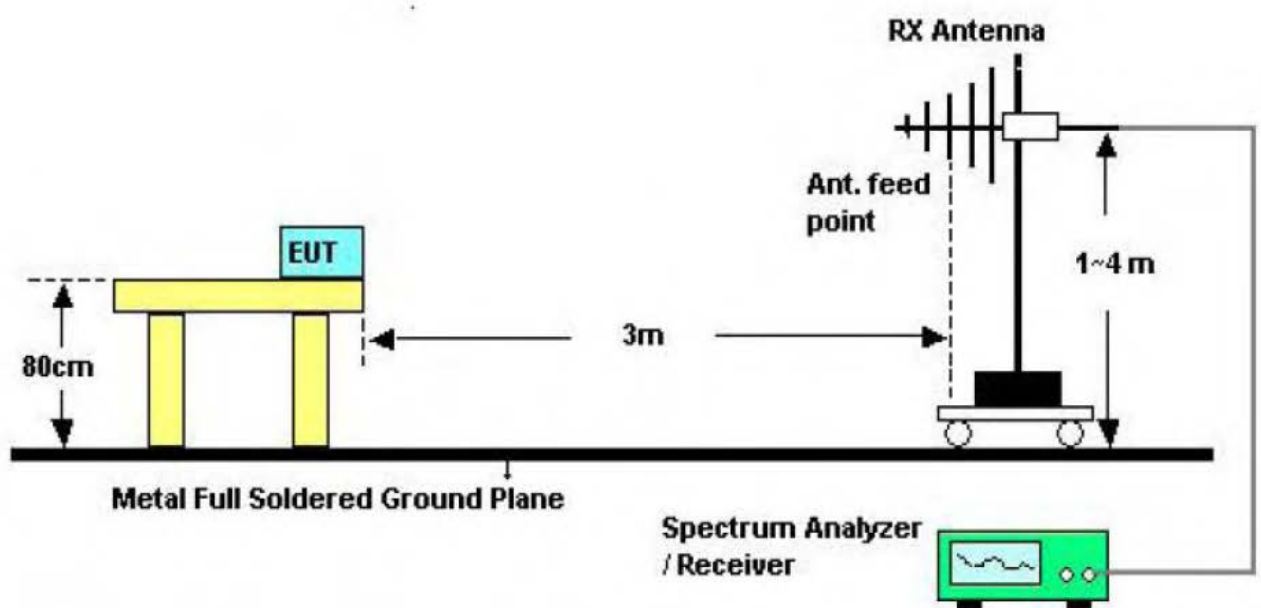
Restricted bands requirement for equipment operating in 2400MHz to 2483.5 MHz (15.249)

Restricted Frequency Band (MHz)	(dBuV/m)(at 3 M)
2310~2390	Attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in 15.209, whichever is the lesser attenuation
2483.5~2500	

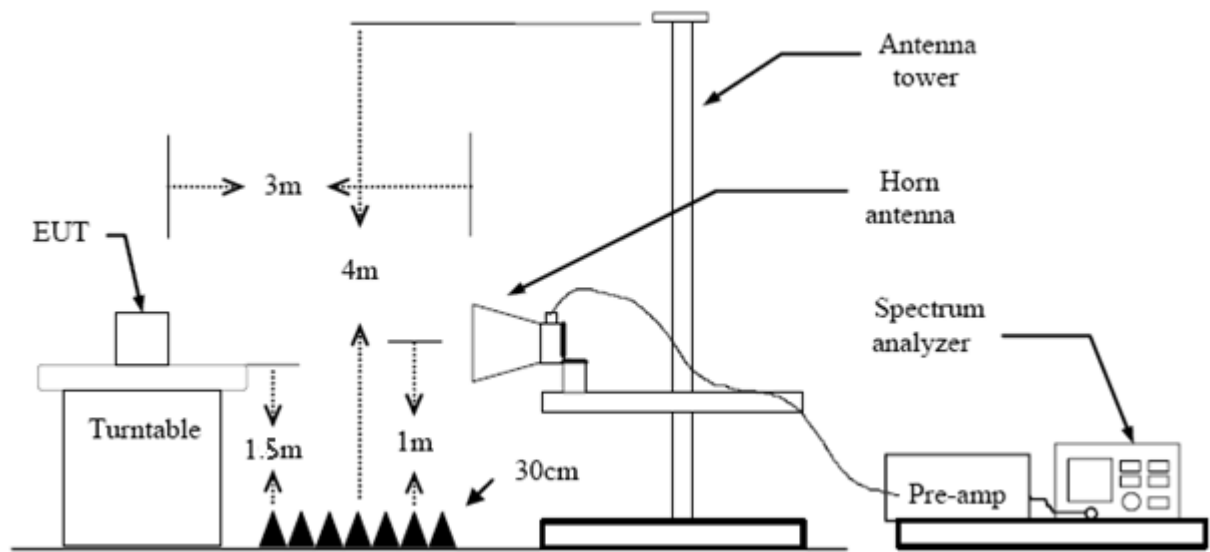
5.2 Test Setup



Bellow 30MHz Test Setup



Bellow 1000MHz Test Setup



Above 1GHz Test Setup

5.3 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.

5.4 EUT Operating Condition

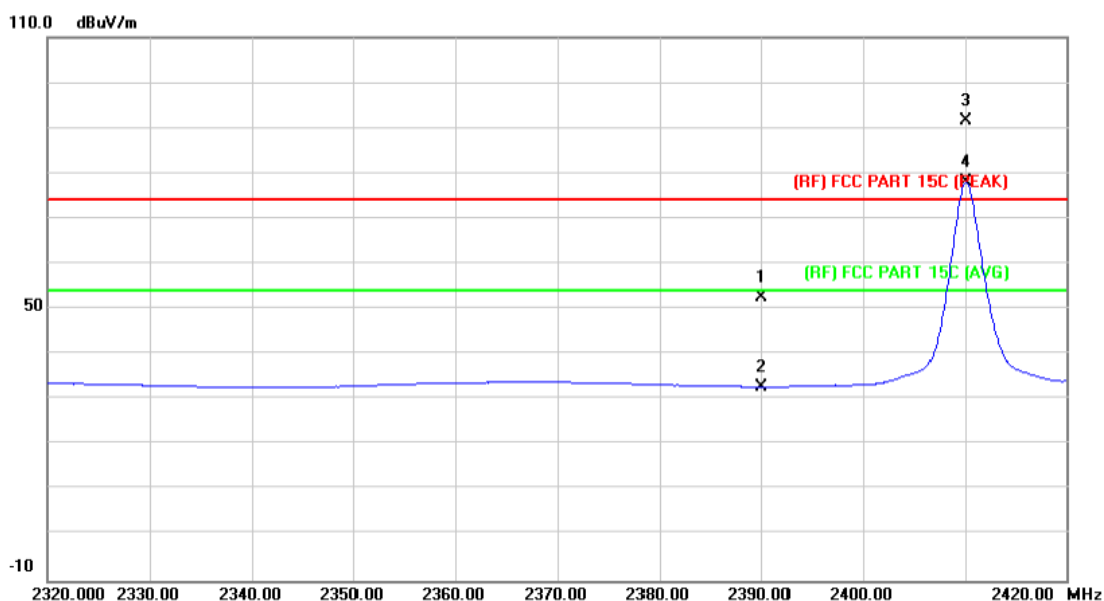
The EUT was set to Continual Transmitting in maximum power, and new batteries are used during testing.

5.5 Test Data

Please see the next page.

5.6.1 Field Strength of the Fundamental

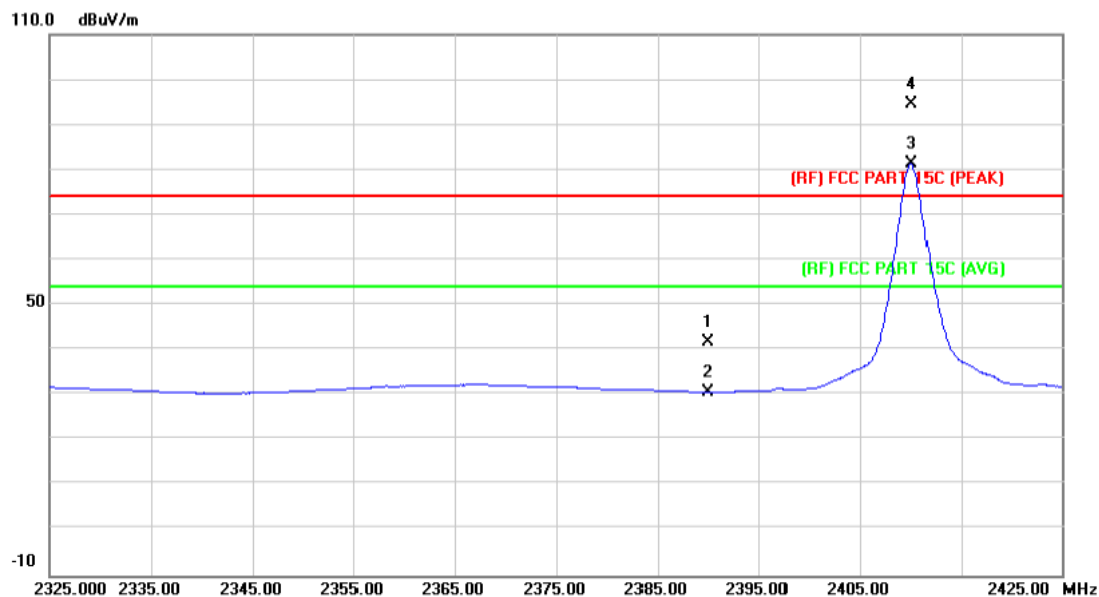
EUT:	Control Box	Model Name :	WKJJ-V4
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60HZ		
Ant. Pol.	Horizontal		
Test Mode:	TX 2410MHz		
Remark:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	51.80	0.77	52.57	74.00	-21.43	peak
2		2390.000	32.07	0.77	32.84	54.00	-21.16	AVG
3	X	2410.100	90.60	0.85	91.45	114.00	-22.55	peak
4	*	2410.100	77.23	0.85	78.08	94.00	-15.92	AVG

Emission Level= Read Level+ Correct Factor

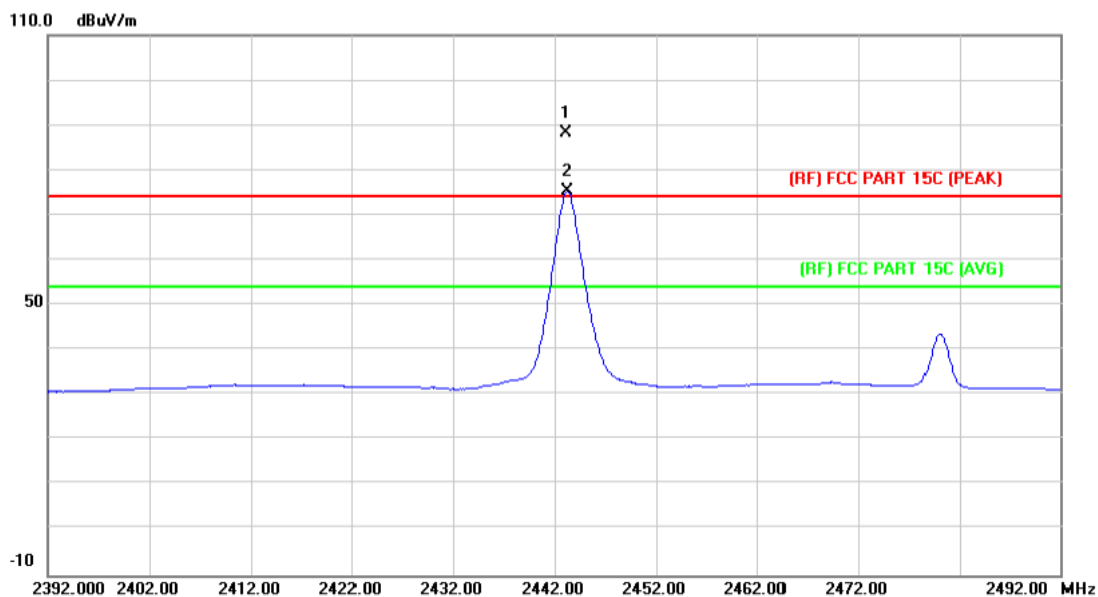
EUT:	Control Box	Model Name :	WKJJ-V4
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60HZ		
Ant. Pol.	Vertical		
Test Mode:	TX 2410MHz		
Remark:			



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		2390.000	41.07	0.77	41.84	74.00	-32.16	peak
2		2390.000	29.91	0.77	30.68	54.00	-23.32	AVG
3	*	2410.100	80.42	0.85	81.27	94.00	-12.73	AVG
4	X	2410.200	93.72	0.85	94.57	114.00	-19.43	peak

Emission Level= Read Level+ Correct Factor

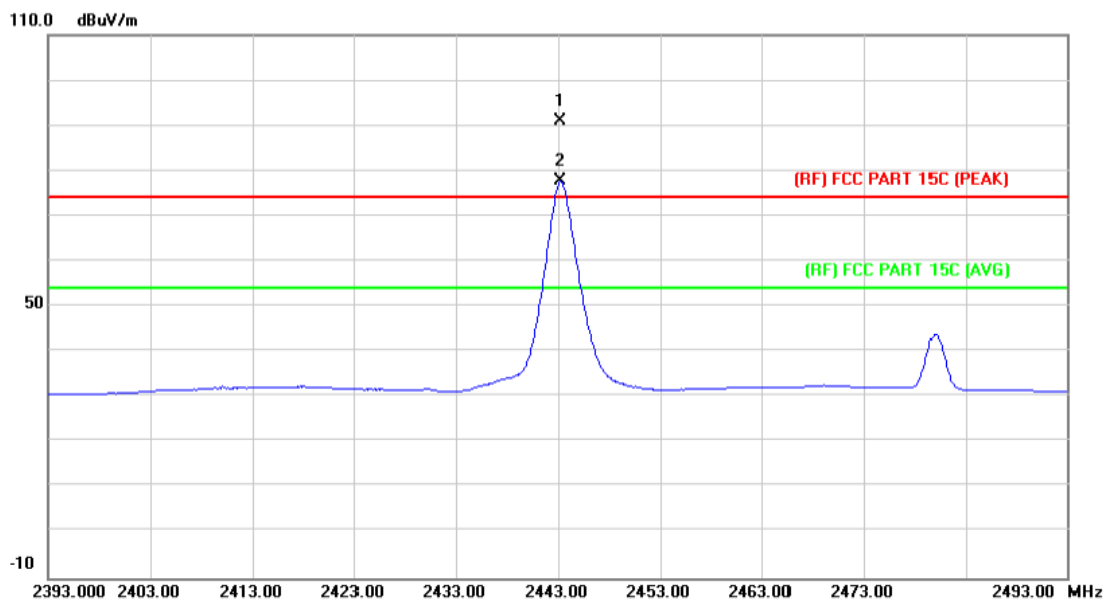
EUT:	Control Box	Model Name :	WKJJ-V4
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60HZ		
Ant. Pol.	Horizontal		
Test Mode:	TX 2443.2469MHz		
Remark:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	X	2443.200	87.33	1.00	88.33	114.00	-25.67	peak
2	*	2443.300	74.33	1.00	75.33	94.00	-18.67	AVG

Emission Level= Read Level+ Correct Factor

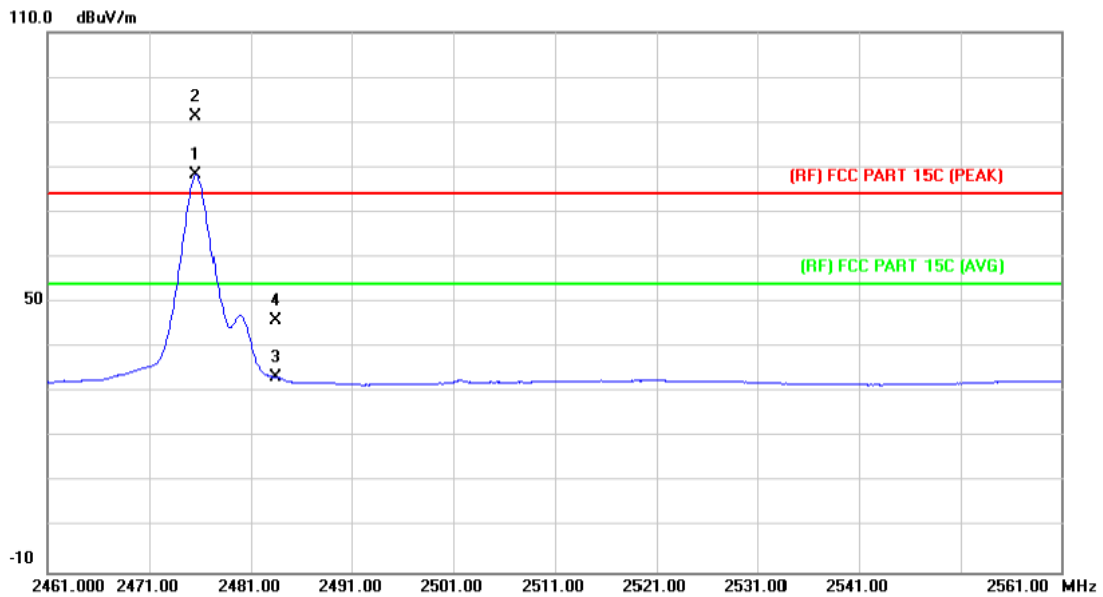
EUT:	Control Box	Model Name :	WKJJ-V4
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60HZ		
Ant. Pol.	Vertical		
Test Mode:	TX 2443.2469MHz		
Remark:			



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1	X	2443.200	89.90	1.00	90.90	114.00	-23.10	peak
2	*	2443.200	76.61	1.00	77.61	94.00	-16.39	AVG

Emission Level= Read Level+ Correct Factor

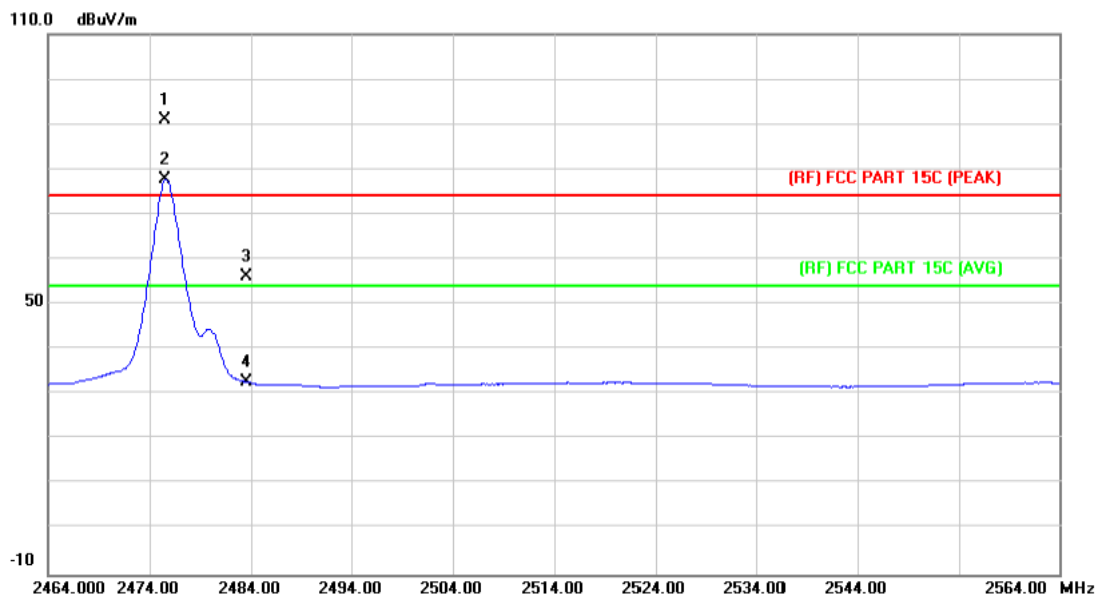
EUT:	Control Box	Model Name :	WKJJ-V4
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60HZ		
Ant. Pol.	Horizontal		
Test Mode:	TX 2475.6829MHz		
Remark:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	X	2475.600	77.11	1.14	78.25	94.00	-15.75	AVG
2	*	2475.600	90.00	1.14	91.14	114.00	-22.86	peak
3		2483.500	32.23	1.17	33.40	74.00	-40.60	AVG
4		2483.500	44.78	1.17	45.95	74.00	-28.05	peak

Emission Level= Read Level+ Correct Factor

EUT:	Control Box	Model Name :	WKJJ-V4
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60HZ		
Ant. Pol.	Vertical		
Test Mode:	TX 2475.6829MHz		
Remark:			



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1	X	2475.600	89.85	1.14	90.99	114.00	-23.01	peak
2	*	2475.600	76.72	1.14	77.86	94.00	-16.14	AVG
3		2483.500	54.97	1.17	56.14	74.00	-17.86	peak
4		2483.500	31.64	1.17	32.81	54.00	-21.19	AVG

Emission Level= Read Level+ Correct Factor

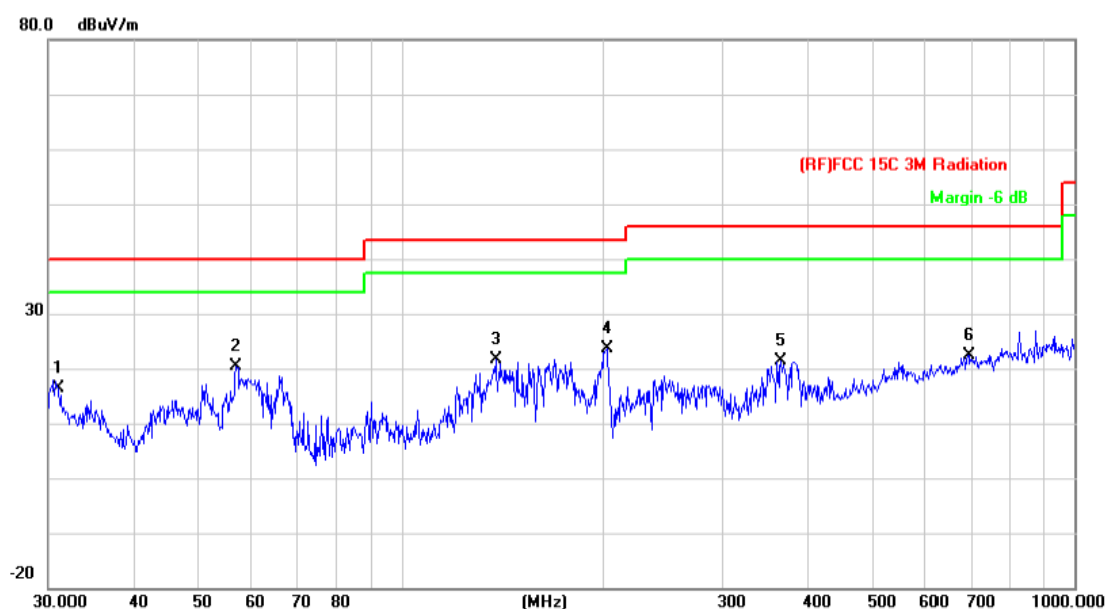
5.6.2 Radiated Spurious Emission (9 KHz~30 MHz)

From 9 KHz to 30 MHz: Conclusion: PASS

Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

5.6.3 Radiated Spurious Emission (Below 1 GHz)

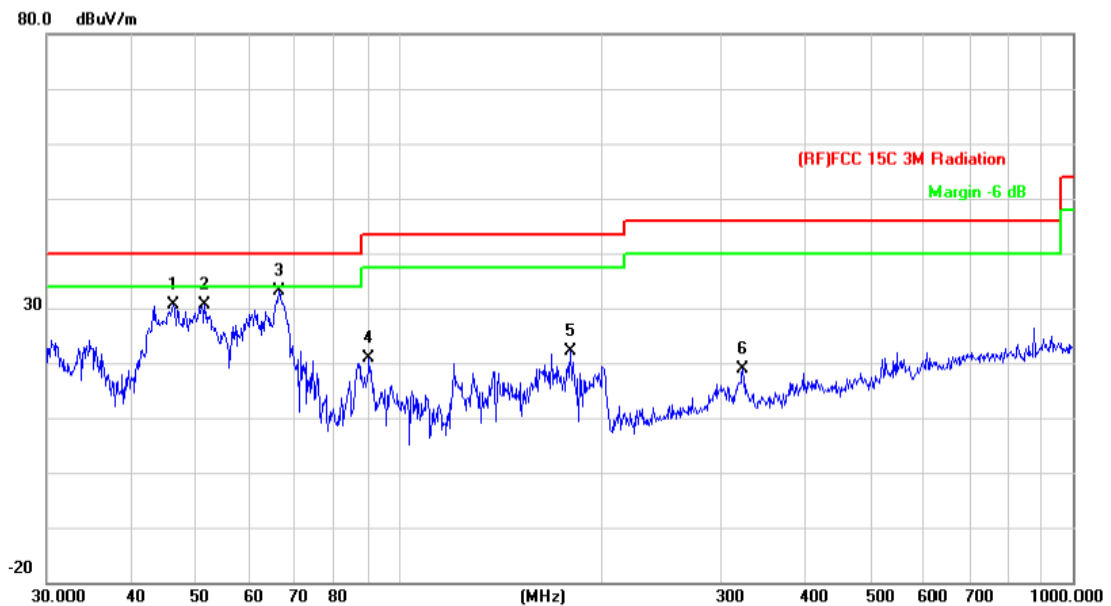
EUT:	Control Box	Model Name :	WKJJ-V4
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60HZ		
Ant. Pol.	Horizontal		
Test Mode:	TX 2410MHZ		
Remark:	Only worse case is reported		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		31.0706	30.91	-14.43	16.48	40.00	-23.52	QP
2	*	56.7917	44.43	-24.15	20.28	40.00	-19.72	QP
3		138.3873	43.32	-21.58	21.74	43.50	-21.76	QP
4		202.1005	43.26	-19.67	23.59	43.50	-19.91	QP
5		366.8231	34.99	-13.71	21.28	46.00	-24.72	QP
6		694.4174	27.92	-5.59	22.33	46.00	-23.67	QP

Emission Level= Read Level+ Correct Factor

EUT:	Control Box	Model Name :	WKJJ-V4
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60HZ		
Ant. Pol.	Vertical		
Test Mode:	TX 2410MHz		
Remark:	Only worse case is reported		

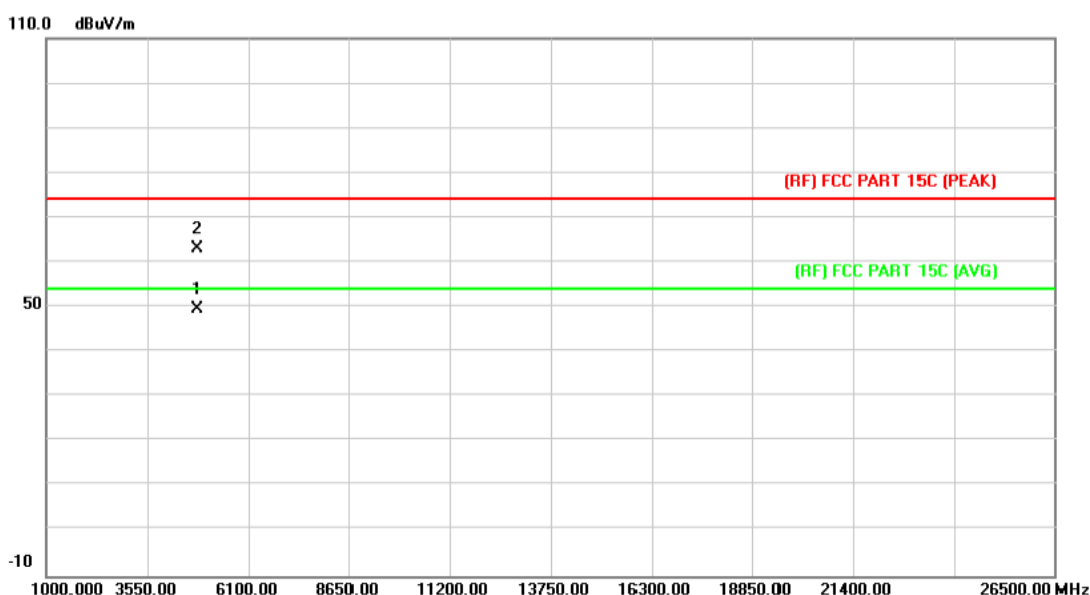


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		46.1779	53.02	-22.48	30.54	40.00	-9.46	QP
2		51.4807	54.79	-24.08	30.71	40.00	-9.29	QP
3	*	66.2662	56.82	-23.62	33.20	40.00	-6.80	QP
4		89.9047	43.27	-22.29	20.98	43.50	-22.52	QP
5		179.3863	42.20	-20.06	22.14	43.50	-21.36	QP
6		323.3204	34.16	-15.40	18.76	46.00	-27.24	QP

Emission Level= Read Level+ Correct Factor

5.6.4 Radiated Spurious Emission (Above 1 GHz)

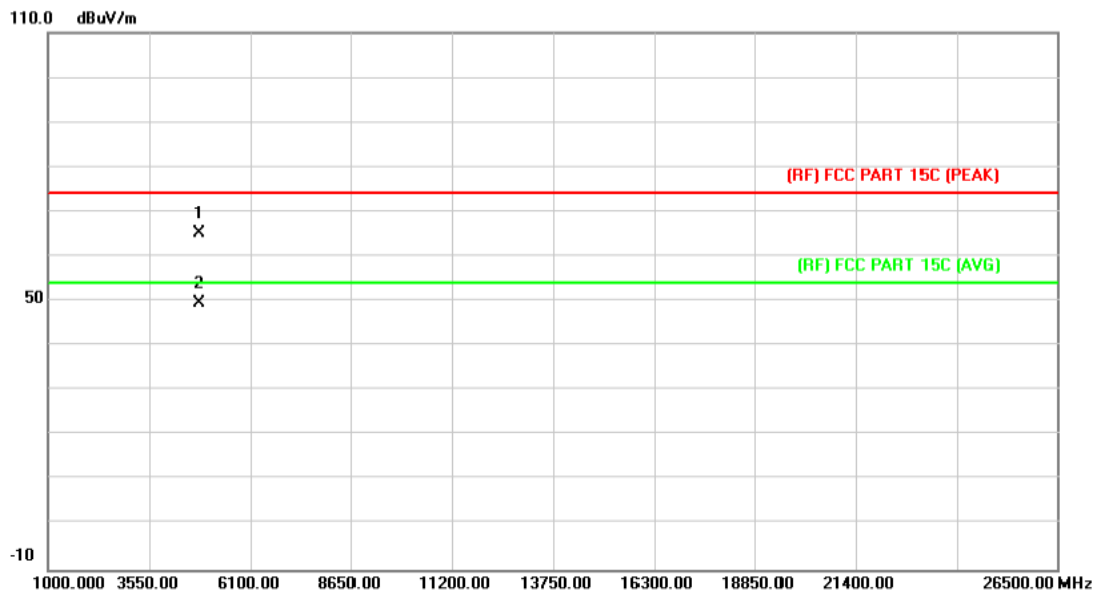
EUT:	Control Box	Model Name :	WKJJ-V4
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60HZ		
Ant. Pol.	Horizontal		
Test Mode:	TX 2410MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4820.010	36.04	13.54	49.58	54.00	-4.42	AVG
2		4820.181	49.42	13.54	62.96	74.00	-11.04	peak

Emission Level= Read Level+ Correct Factor

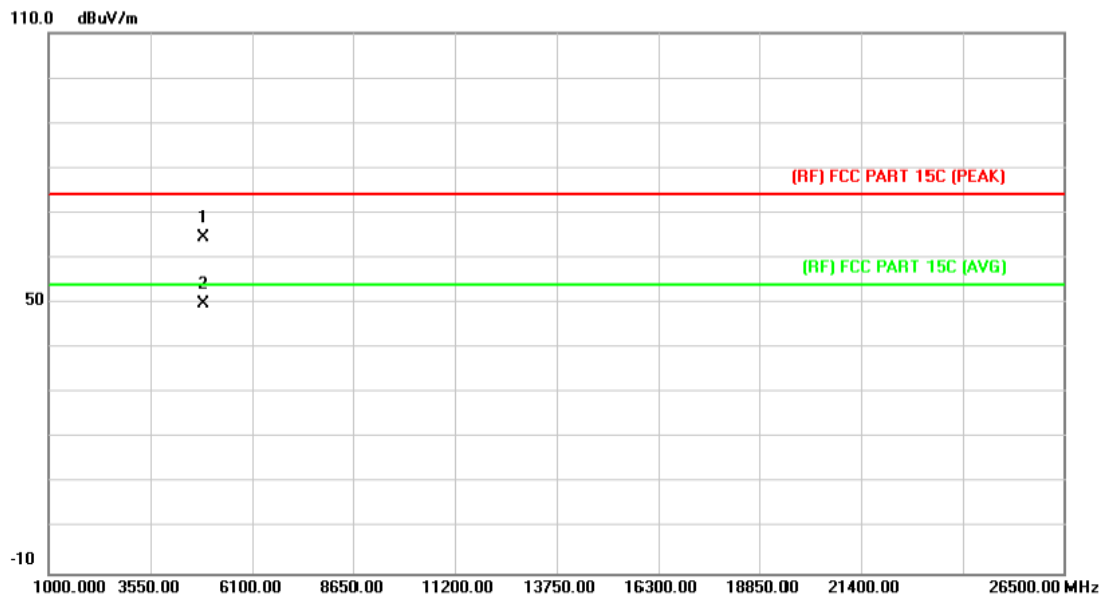
EUT:	Control Box	Model Name :	WKJJ-V4
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60HZ		
Ant. Pol.	Vertical		
Test Mode:	TX 2410MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4819.926	51.73	13.54	65.27	74.00	-8.73	peak
2	*	4820.031	36.06	13.54	49.60	54.00	-4.40	AVG

Emission Level= Read Level+ Correct Factor

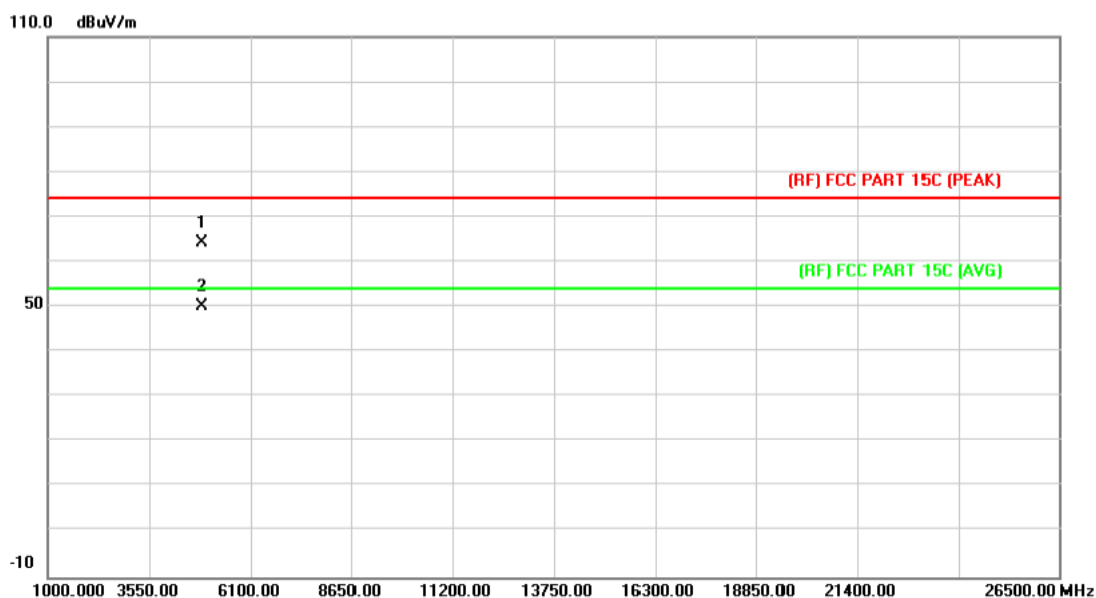
EUT:	Control Box	Model Name :	WKJJ-V4
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60HZ		
Ant. Pol.	Horizontal		
Test Mode:	TX 2443.2469MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		4886.478	50.52	13.93	64.45	74.00	-9.55	peak
2	*	4886.500	35.86	13.93	49.79	54.00	-4.21	AVG

Emission Level= Read Level+ Correct Factor

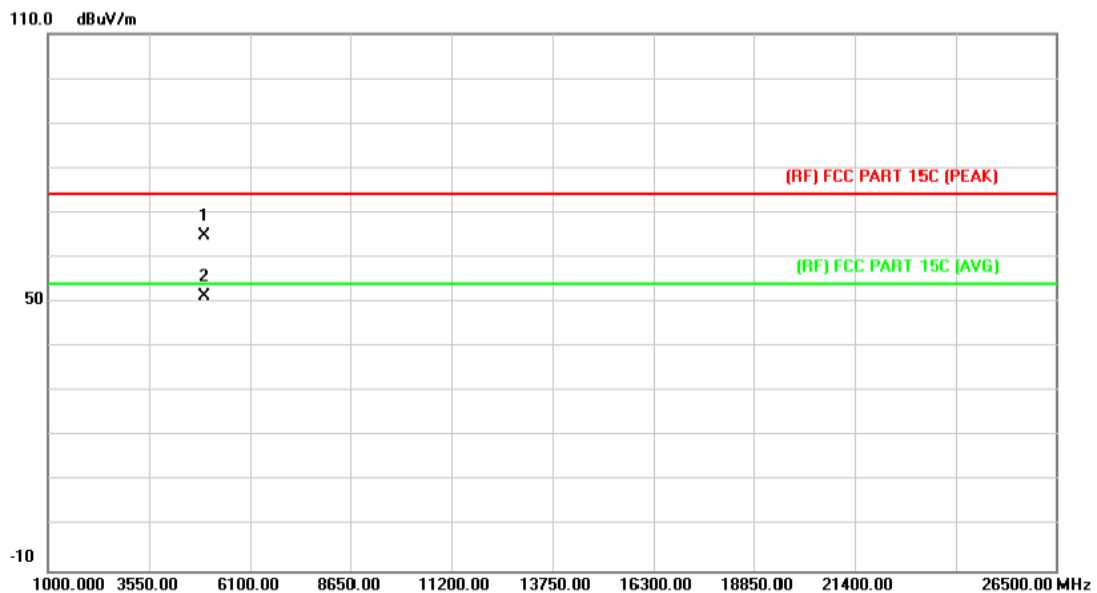
EUT:	Control Box	Model Name :	WKJJ-V4
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60HZ		
Ant. Pol.	Vertical		
Test Mode:	TX 2443.2469MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		4886.000	50.34	13.93	64.27	74.00	-9.73	peak
2	*	4886.479	36.08	13.93	50.01	54.00	-3.99	AVG

Emission Level= Read Level+ Correct Factor

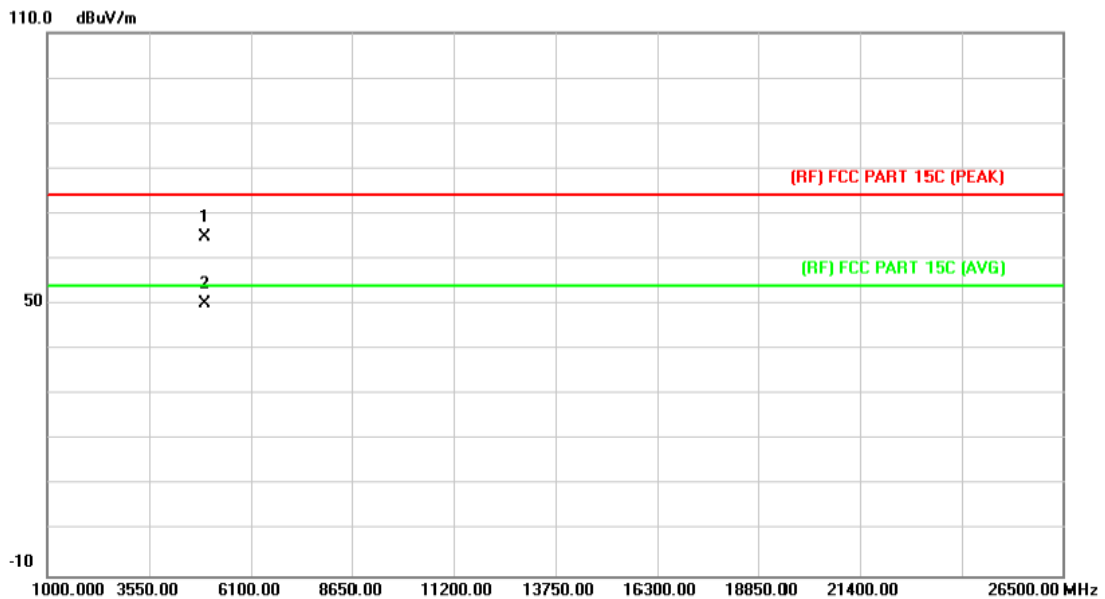
EUT:	Control Box	Model Name :	WKJJ-V4
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60HZ		
Ant. Pol.	Horizontal		
Test Mode:	TX 2475.6829MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		4951.313	50.68	14.32	65.00	74.00	-9.00	peak
2	*	4951.332	37.07	14.32	51.39	54.00	-2.61	AVG

Emission Level= Read Level+ Correct Factor

EUT:	Control Box	Model Name :	WKJJ-V4
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60HZ		
Ant. Pol.	Vertical		
Test Mode:	TX 2475.6829MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		

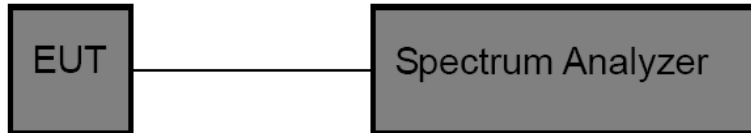


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		4951.322	50.46	14.32	64.78	74.00	-9.22	peak
2	*	4951.394	35.98	14.32	50.30	54.00	-3.70	AVG

Emission Level= Read Level+ Correct Factor

6. Bandwidth Test

6.1 Test Setup



6.2 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting:
Bandwidth: RBW=100 kHz, VBW=300kHz.
- (3) The bandwidth is measured at an amplitude level reduced 20dB 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.

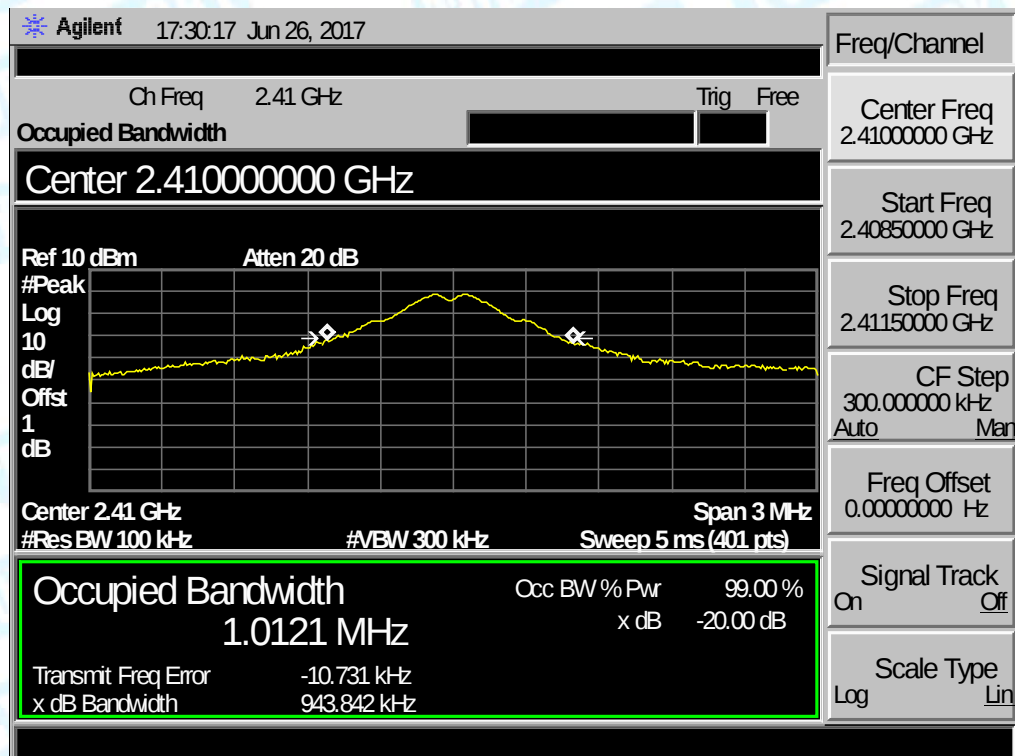
6.3 EUT Operating Condition

The EUT was set to continuously transmitting for the Bandwidth Test.

6.4 Test Data

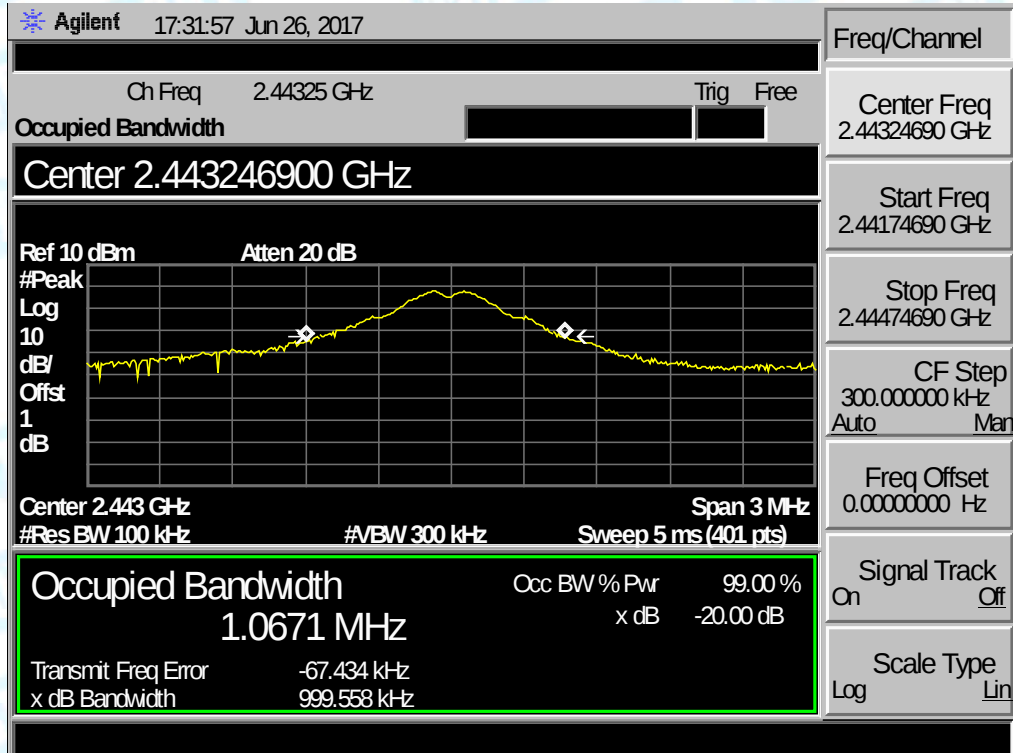
Low Channel Frequency (MHz)	20dB Bandwidth (KHz)
2410	943.842

2410 MHz



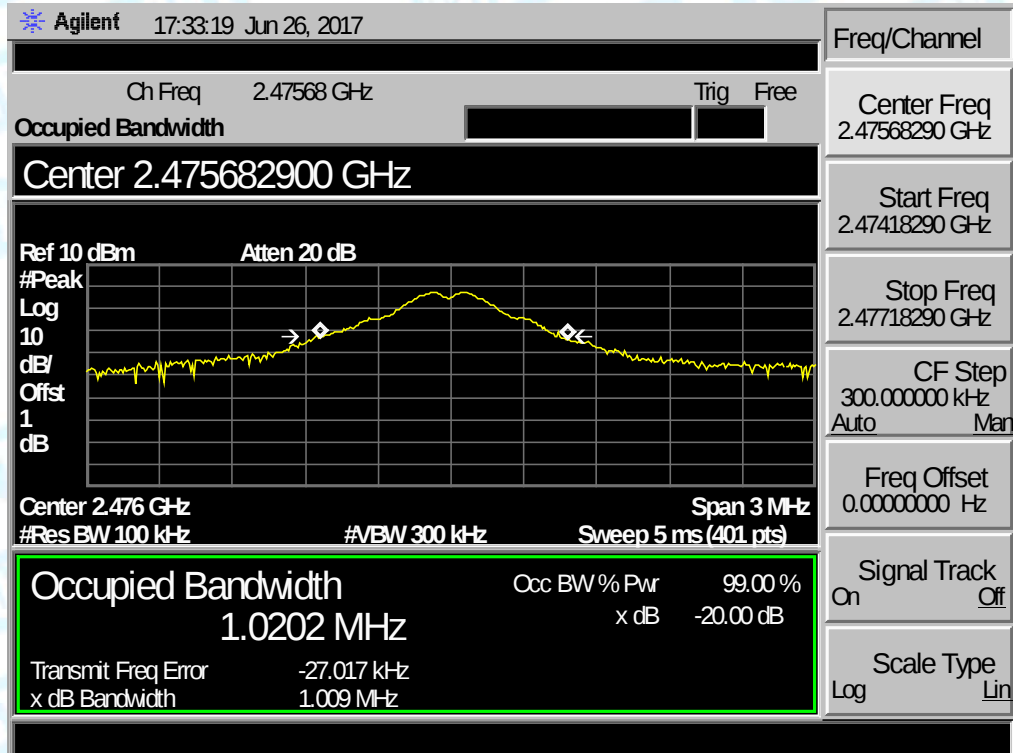
MID Channel Frequency (MHz)	20dB Bandwidth (KHz)
2443.2469	999.558

2443.2469 MHz



HIGH Channel Frequency (MHz)	20dB Bandwidth (KHz)
2475.6829	1009

2475.6829 MHz



7. Antenna Requirement

7.1 Standard Requirement

7.1.1 Standard

FCC Part 15.203

7.1.2 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.

7.2 Antenna Connected Construction

The directional gains of the antenna used for transmitting is 0dBi, and the antenna de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

7.3 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-----