Testing
NVLAP LAB CODE 600222-0

MEASUREMENT REPORT

FCC PART 15.247 / RSS-247 Bluetooth

Report No.: S20210419941903
Issue Date: 05-14-2021

Applicant:	kantiantech Inc.
Address:	NO.3 JinPin Street,Ya An Road,NanKai District.Tianjin China
FCC ID:	2AWHIWSPRK1
IC:	26041-WSPRK1
Product:	WYZE SPRINKLER CONTROLLER
Model No.:	WSPRK1
FCC Classification:	FCC Part 15 Spread Spectrum Transmitter (DSS)
FCC Rule Part(s):	Part 15 Subpart C (15.247)
IC Rule(s):	RSS-247 Issue 2, RSS-GEN Issue 5
Test Procedure(s):	ANSI C63.10-2013
Test Date:	April 19 ~ 28, 2021

Reviewed By: (Line Chen)
Senior Test Engineer

Approved By: (Kerry Zhou)
Engineer Manager

FANGGUANG INSPECTION & TESTING CO.,LTD APPROVED(02)

The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

The test report must not be used by the client to claim product certifications, approval, or endorsement by NVLAP, NIST or any agency of U.S. Government.

Revision History

Report No.	Version	Description	Issue Date
S20210419941903	Rev. 01	This is a C2PC project, the modification is the LED, TVS tube, Fuse and Resistance on the circuit board, not effect the RF circuit and antenna, Therefore, only the worst mode of Radiated Restricted Band Edge and Radiated Spurious Emission is reevaluated, the original test data please refer to the test report: S202005114008E03	05-14-2021

CONTENTS

Description Page

§2.1033 General Information

Applicant:	kantiantech Inc.
Applicant Address:	NO.3 JinPin Street,Ya An Road,NanKai District.Tianjin China
Manufacturer:	kantiantech Inc.
Manufacturer Address:	NO.3 JinPin Street,Ya An Road,NanKai District.Tianjin China
Factory:	kantiantech Inc.
Factory Address:	NO.3 JinPin Street,Ya An Road,NanKai District.Tianjin China
Test Site:	Fangguang Inspection & Testing Co., Ltd.
Test Site Address:	200 Linghu Avenue, Xinwu District, Wuxi City, China
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering
FCC Classification:	FCC Part 15 Spread Spectrum Transmitter (DSS)

1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

1.2. Fangguang Test Location

These measurement tests were performed at the Fangguang Inspection and testing Co.,LTD located at 200 Linghu Avenue, Xinwu District, Wuxi City. The detailed description of the measurement facility was found to be in compliance with the requirements of ANSI C63.10-2013.

2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name:	WYZE SPRINKLER CONTROLLER
Model Name:	WSPRK1
Input Voltage Range:	AC 24V~, 60Hz, 800mA
Wi-Fi Specification:	802.11b/g/n-HT20/n-HT40
Bluetooth Version:	V3.0/4.0
Adapter Information:	Model: HMQ-SM2401 Rated Input: 120V~, 60Hz , Max. Input current: 800mA, Rated Output: 24V~, 1.0A

2.2. Product Specification Subjective to this Standard

Operating Frequency:	2402~2480MHz
Channel Number:	79
Type of modulation:	GFSK, Pi/4 DQPSK, 8DPSK
Data Rate:	1Mbps(GFSK), 2Mbps(Pi/4 DQPSK), 3Mbps (8DPSK)
Antenna Type:	FPC Antenna
Antenna Gain:	2.64dBi

The equipment under test (EUT) is the **WYZE SPRINKLER CONTROLLER**. The test data contained in this report pertains only to the emissions due to the EUT's Bluetooth transmitter.

- 15.247(g): In accordance with the Bluetooth Industry Standard, the system is designed to comply with all of the regulations in Section 15.247 when the transmitter is presented with a continuous data (or information) system.

- 15.247(h): In accordance with the Bluetooth Industry Standard, the system does not coordinate its channels selection/ hopping sequence with other frequency hopping systems for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

- 15.247(h): The EUT employs Adaptive Frequency Hopping (AFH) which identifies sources of interference namely devices operating in 802.11 WLAN and excludes them from the list of available channels. The process of re-mapping reduces the number of test channels from 79 channels to a minimum number of 20 channels.

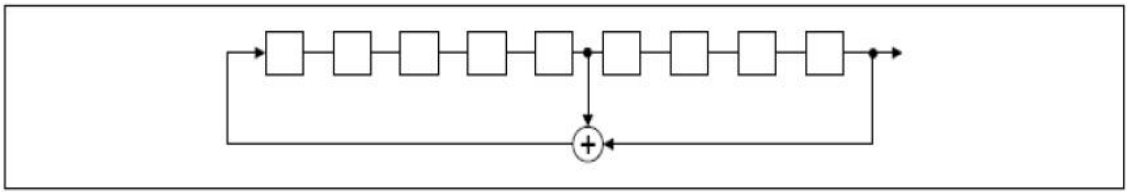
2.3. Operation Frequency / Channel List

Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2403 MHz	02	2404 MHz
03	2405 MHz	04	2406 MHz	05	2407 MHz
06	2408 MHz	07	2409 MHz	08	2410 MHz
09	2411 MHz	10	2412 MHz	11	2413 MHz
12	2414 MHz	13	2415 MHz	14	2416 MHz
15	2417 MHz	16	2418 MHz	17	2419 MHz
18	2420 MHz	19	2421 MHz	20	2422 MHz
21	2423 MHz	22	2424 MHz	23	2425 MHz
24	2426 MHz	25	2427 MHz	26	2428 MHz
27	2429 MHz	28	2430 MHz	29	2431 MHz
30	2432 MHz	31	2433 MHz	32	2434 MHz
33	2435 MHz	34	2436 MHz	35	2437 MHz
36	2438 MHz	37	2439 MHz	38	2440 MHz
39	2441 MHz	40	2442 MHz	41	2443 MHz
42	2444 MHz	43	2445 MHz	44	2446 MHz
45	2447 MHz	46	2448 MHz	47	2449 MHz
48	2450 MHz	49	2451 MHz	50	2452 MHz
51	2453 MHz	52	2454 MHz	53	2455 MHz
54	2456 MHz	55	2457 MHz	56	2458 MHz
57	2459 MHz	58	2460 MHz	59	2461 MHz
60	2462 MHz	61	2463 MHz	62	2464 MHz
63	2465 MHz	64	2466 MHz	65	2467 MHz
66	2468 MHz	67	2469 MHz	68	2470 MHz
69	2471 MHz	70	2472 MHz	71	2473 MHz
72	2474 MHz	73	2475 MHz	74	2476 MHz
75	2477 MHz	76	2478 MHz	77	2479 MHz
78	2480 MHz	-	-	-	-

2.4. Pseudorandom Frequency Hopping Sequence

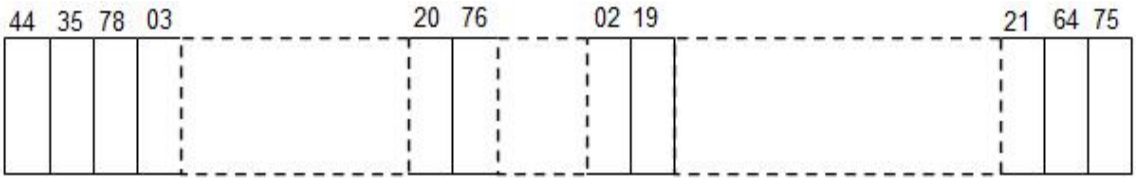
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence: 2^9 - 1 = 511 bits
- Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



Each frequency used equally on the average by each transmitter.

The system receivers have input bandwidths that match the hopping channel bandwidths of their Corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

2.5. Device Capabilities

This device contains the following capabilities:

2.4GHz WLAN (DTS) & Bluetooth (v3.0/4.0)

Note: The maximum achievable duty cycle was determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are are as follows:

Test Mode	Duty Cycle
DH5	76.80%
2DH5	77.20%
3DH5	76.87%

2.6. Description of Test Software

The test utility software used during testing was “ESP_RF_test_tool”, the version was v2.3

Power Parameter Value

Test Mode	Test Channel No.	Test Frequency (MHz)	Power Parameter Value
DH5	00	2402	6
	39	2441	6
	78	2480	6
2DH5	00	2402	6
	39	2441	6
	78	2480	6
3DH5	00	2402	6
	39	2441	6
	78	2480	6

2.7. Test Configuration

The EUT was tested per the guidance of ANSI C63.10-2013. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing.

2.8. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.9. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

RSP-100 Issue 11 Section 3

The manufacturer, importer or distributor shall meet the labelling requirements set out in this section for every unit:

(i) prior to marketing in Canada, for products manufactured in Canada

(ii) prior to importation into Canada, for imported products

For information regarding the e-labelling option, see Notice 2014-DRS1003. The label for the certified product represents the manufacturer's or importer's compliance with Innovation, Science and Economic Development Canada's (ISED) regulatory requirements.

Please see attachment for IC label and label location.

3. DESCRIPTION of TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013), and the “Filing were used in the measurement of the EUT.

Deviation from measurement procedure…….....None

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 9'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions were used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.

3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. The turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-40GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB Beamwidth of horn antenna, the horn antenna should be always directed to the EUT when rising height.

4. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 antenna of the EUT is **permanently attached.**
- There are no provisions for connection to an external antenna.

5. TEST EQUIPMENT CALIBRATION DATE

Radiated Emission

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Loop Antenna	Schwarzbeck	FMZB 1519B	FWXGJC-2018-015	1 year	2021/08/23
Bi-Log Antenna	R&S	HL562E	FWXGJC-2016-267-06	3 year	2022/03/30
Broadband Horn Antenna	R&S	HF907	FWXGJC-2016-267-07	1 year	2022/03/30
Broadband Horn Antenna	Schwarzbeck	BBHA9170	FWXGJC-2018-016	1 year	2021/08/19
EMI Receiver	R&S	ESR26	FWXGJC-2016-267-01	1 year	2022/01/17
Pre-Amplifier	R&S	SCU-18D	FWXGJC-2016-267-05	1 year	2022/01/15
Pre-Amplifier	R&S	EMC184055 SE	FWXGJC-2018-018	1 year	2021/07/10
Thermohygrometer	Yuhuaze	HTC-1	FWXDA-2016-386	1 year	2022/01/17
Anechoic Chamber	Aimuke	EMCCT-3	FWXGJC-2016-270	1 year	2023/04/07

Test Software	Manufacturer	Version	Asset No.	Function
EMI Test Software	tonscend	/	/	/

6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Radiated Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 2.72dB
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 30MHz-1GHz: 1.00 dB 1GHz-26.5GHz: 1.30 dB

7. TEST RESULT

7.1. Summary

FCC Part Section(s)	IC Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(1)	RSS-247 [5.1]	20dB Bandwidth	N/A	Conducted	Note 3	Section 7.2
15.247(b)(1)	RSS-247 [5.4(b)]	Peak Transmitter Output Power	<0.125 Watt if > 75 non- overlapping channels used		Note 3	Section 7.3
15.247(a)(1)	RSS-247 [5.1]	Channel Separation	> 2/3 of 20 dB BW for systems with Output Power < 125mW		Note 3	Section 7.4
15.247(a)(1)(iii)	RSS-247 [5.1]	Number of Channels	> 15 Channels		Note 3	Section 7.5
15.247(a)(1)(iii)	RSS-247 [5.1]	Time of Occupancy	< 0.4 sec in 31.6 sec period		Note 3	Section 7.6
15.247(d)	RSS-247 [5.5]	Band Edge / out-of-Band Emissions	Conducted ≥ 20dBc		Note 3	Section 7.7 Section 7.8
15.205, 15.209	RSS-247 [5.5]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	Radiated	PASS	Section 7.9 Section 7.10
15.207	RSS-Gen [8.8]	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Note 3	Section 7.11

Notes:

1) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
2) All modes of operation and data rates were investigated. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.
3) The original test data please refer to the test report: S202005114008E03

7.2. Radiated Spurious Emission Measurement

7.2.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

7.2.2. Test Procedure Used

ANSI C63.10 Section 6.3 (General Requirements)

ANSI C63.10 Section 6.4 (Standard test method below 30MHz)

ANSI C63.10 Section 6.5 (Standard test method above 30MHz to 1GHz)

ANSI C63.10 Section 6.6 (Standard test method above 1GHz)

7.2.3. Test Setting

Quasi-Peak Measurements below 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = as specified in Table 1
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

Table 1 - RBW as a function of frequency

Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000 MHz	1 MHz

Peak Measurements above 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Measurements above 1GHz (Method VB)

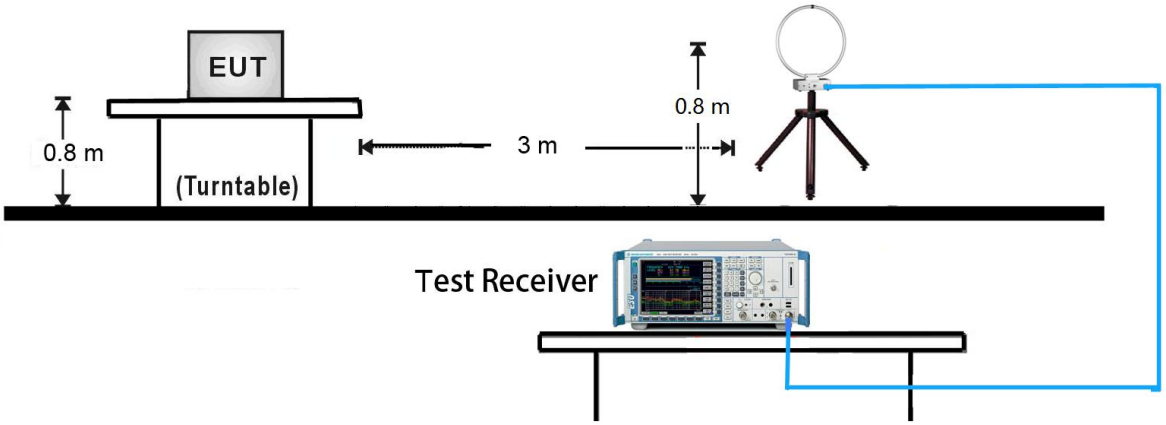
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; If the EUT is configured to transmit with duty cycle ≥ 98%, set VBW = 10 Hz.
   If the EUT duty cycle is < 98%, set VBW ≥ 1/T. T is the minimum transmission duration.
4. Detector = Peak
5. Sweep time = auto

6. Trace mode = max hold

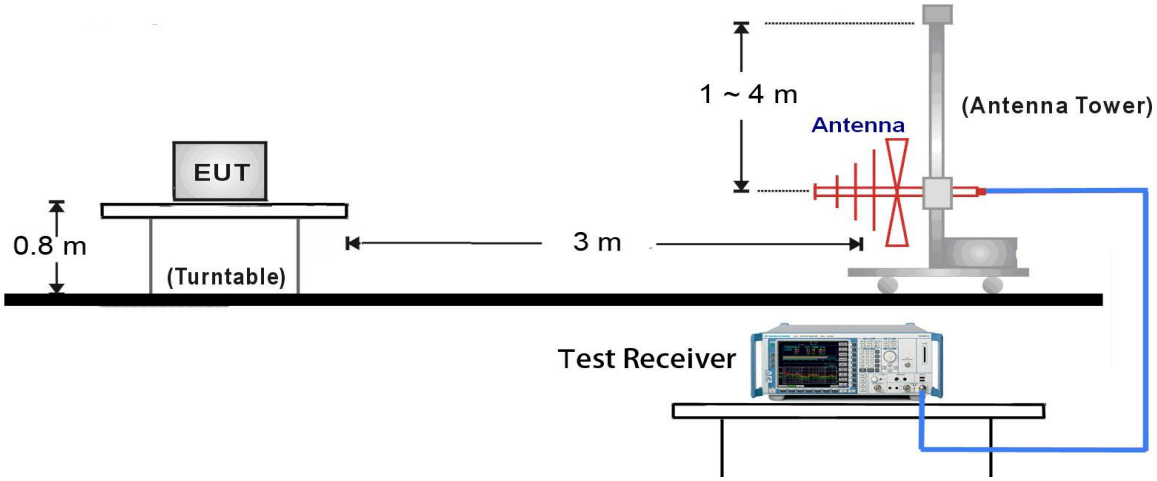
7. Trace was allowed to stabilize

7.2.4. Test Setup

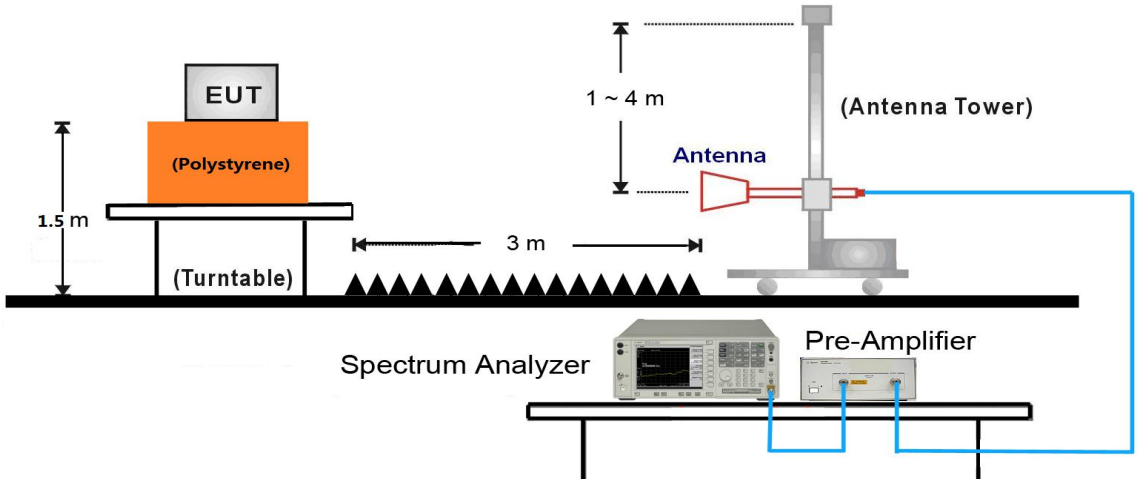
9kHz ~ 30MHz Test Setup:



30MHz ~ 1GHz Test Setup:



1GHz ~ 25GHz Test Setup:



7.2.5. Test Result

Test Mode:	3DH5 - Ant 1	Test Date:	2021-04-26
Test Channel:	00	Test Engineer:	Line Chen
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report. 3. The worst case of Radiated Spurious Emission is this mode.		

Mark	Frequency (MHz)	Level (dBμV)	Factor (dB)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4200.0000	42.02	6.25	74.00	31.98	Peak	Horizontal
	4800.0000	43.89	7.53	74.00	30.11	Peak	Horizontal
*	7120.0000	49.82	14.70	75.25	25.43	Peak	Horizontal
*	8871.0000	51.30	15.77	75.25	23.95	Peak	Horizontal
	4783.0000	43.21	7.50	74.00	30.79	Peak	Vertical
	7620.0000	49.41	14.75	74.00	24.59	Peak	Vertical
*	9578.0000	51.68	17.27	75.25	23.57	Peak	Vertical
*	10253.0000	52.84	18.14	75.25	22.41	Peak	Vertical
Note 1: “*” is not in restricted band, its limit is 20dBc of the fundamental emission level (95.25dBμV/m) or 15.209 which is higher.							

Test Mode:	3DH5 - Ant 1	Test Date:	2021-04-26
Test Channel:	39	Test Engineer:	Line Chen
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report. 3. The worst case of Radiated Spurious Emission is this mode.		

Mark	Frequency (MHz)	Level (dBμV)	Factor (dB)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4800.0000	43.45	7.53	74.00	30.55	Peak	Horizontal
	5423.0000	46.70	9.70	74.00	27.30	Peak	Horizontal
*	6750.0000	47.45	13.64	78.38	30.93	Peak	Horizontal
*	9872.0000	52.52	17.43	78.38	25.86	Peak	Horizontal
	4800.0000	43.16	7.53	74.00	30.84	Peak	Vertical
	5132.0000	43.23	8.16	74.00	30.77	Peak	Vertical
*	6782.0000	46.96	13.84	78.38	31.42	Peak	Vertical
*	7200.0000	49.74	14.95	78.38	28.64	Peak	Vertical
Note 1: “*” is not in restricted band, its limit is 20dBc of the fundamental emission level (98.38dBμV/m) or 15.209 which is higher.							

Test Mode:	3DH5 - Ant 1	Test Date:	2021-04-26
Test Channel:	78	Test Engineer:	Line Chen
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report. 3. The worst case of Radiated Spurious Emission is this mode.		

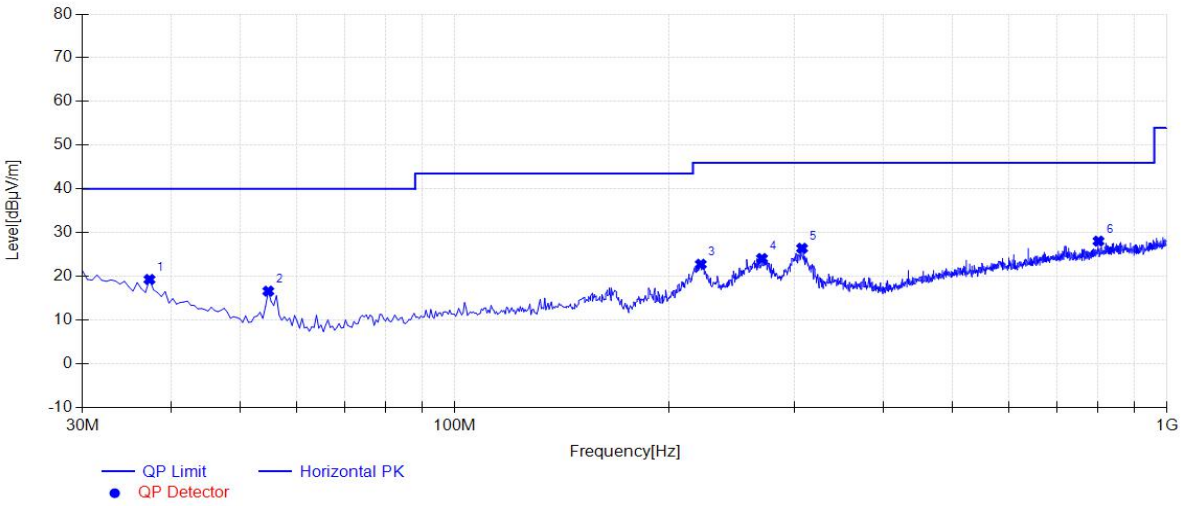
Mark	Frequency (MHz)	Level (dBμV)	Factor (dB)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4783.0000	42.82	7.50	74.00	31.18	Peak	Horizontal
	7620.0000	50.35	14.75	74.00	23.65	Peak	Horizontal
*	9578.0000	51.21	17.27	80.74	29.53	Peak	Horizontal
*	10253.0000	52.19	18.14	80.74	28.55	Peak	Horizontal
	4200.0000	42.44	6.25	74.00	31.56	Peak	Vertical
	4800.0000	43.72	7.53	74.00	30.28	Peak	Vertical
*	7120.0000	48.91	14.70	80.74	31.83	Peak	Vertical
*	8871.0000	51.10	15.77	80.74	29.64	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is 20dBc of the fundamental emission level (100.74dBμV/m) or 15.209 which is higher.

The Worst Case of Radiated Emission below 1GHz:

EUT:	WYZE SPRINKLER CONTROLLER	Polarity:	Horizontal
Model:	WSPRK1	SN:	N/A
Mode:	Transmit by DH5 at Channel 2480MHz	Voltage:	120V/60Hz
Environment:	Temp: 25℃; Humi:60%	Engineer:	Line Chen

Test Graph

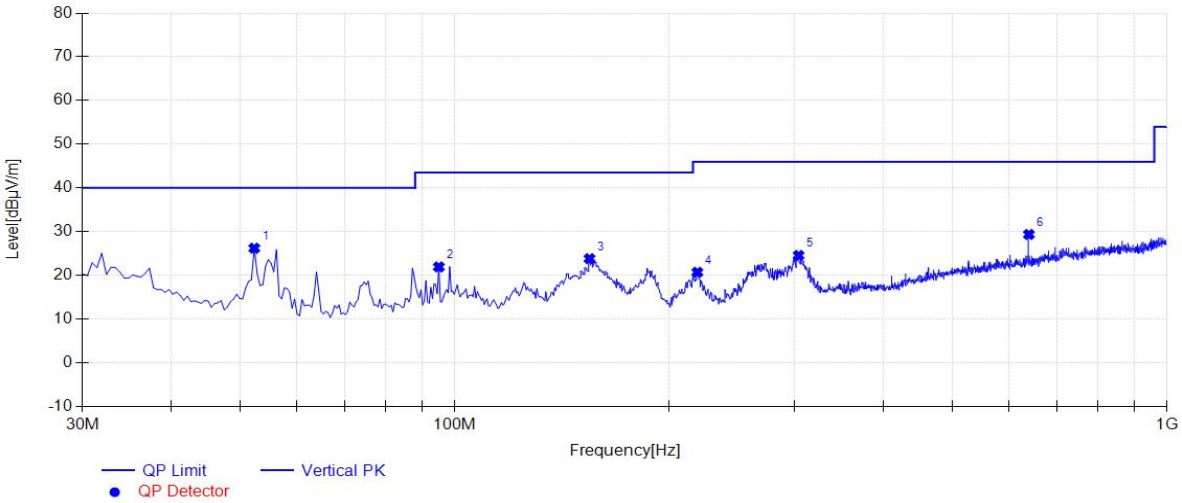


Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	37.2750	19.28	16.02	40.00	20.72	100	97	Horizontal
2	54.7350	16.61	8.23	40.00	23.39	200	105	Horizontal
3	221.575	22.76	10.50	46.00	23.24	100	263	Horizontal
4	270.075	24.09	12.44	46.00	21.91	100	291	Horizontal
5	307.420	26.42	13.92	46.00	19.58	100	90	Horizontal
6	801.635	28.06	23.59	46.00	17.94	200	344	Horizontal

Note 1: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

EUT:	WYZE SPRINKLER	Polarity:	Vertical
Model:	WSPRK1	SN:	N/A
Mode:	Transmit by DH5 at Channel 2480MHz	Voltage:	120V/60Hz
Environment:	Temp: 25℃; Humi:60%	Engineer:	Line Chen

Test Graph



Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	52.3100	26.21	8.89	40.00	13.79	100	198	Vertical
2	94.9900	21.93	10.61	43.50	21.57	100	86	Vertical
3	154.645	23.82	10.60	43.50	19.68	100	183	Vertical
4	219.150	20.70	10.41	46.00	25.30	100	299	Vertical
5	304.025	24.56	13.84	46.00	21.44	100	117	Vertical
6	640.130	29.36	20.92	46.00	16.64	100	328	Vertical

Note 1: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

7.3. Radiated Restricted Band Edge Measurement

For 15.205 requirement:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a).

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1] 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.25 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41	--	--	--

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

For RSS-Gen Section 8.10 requirement:

Radiated emissions which fall in the restricted bands, as defined in Section 8.10 of RSS-Gen, must also comply with the radiated emission limits specified in Section 8.9.

Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.009 - 0.110	240 - 285	9.0 - 9.2
2.1735 - 2.1905	322 - 335.4	9.3 - 9.5
3.020 - 3.026	399.9 - 410	10.6 - 12.7
4.125 - 4.128	608 - 614	13.25 - 13.4
4.17725 - 4.17775	960 - 1427	14.47 - 14.5
4.20725 - 4.20775	1435 - 1626.5	15.35 - 16.2
5.677 - 5.683	1645.5 - 1646.5	17.7 - 21.4
6.215 - 6.218	1660 - 1710	22.01 - 23.12
6.26775 - 6.26825	1718.8 -1722.2	23.6 - 24.0
6.31175 - 6.31225	2200 - 2300	31.2 - 31.8
8.291 - 8.294	2310 -2390	36.43 - 36.5
8.362 - 8.366	2655 - 2900	Above 38.6
8.37625 - 8.38675	3260 - 3267	--
8.41425 - 8.41475	3332 -3339	
12.29 - 12.293	334.5 - 3358	
12.51975 - 12.52025	3500 - 4400	
12.57675 - 12.57725	4500 - 5150	
13.36 -13.41	5350 - 5460	
16.42 - 16.423	7250 - 7750	
16.69475 - 16.69525	8025 - 8500	
16.80425 - 16.80475	--	
25.5 - 25.67		
37.5 - 38.25		
73 - 74.6		
74.8 - 75.2		
108 - 138		
156.52475 - 156.525225		
156.7 - 156.9		

All out of band emissions appearing in a restricted band as specified in Section 8.10 of the RSS-Gen

must not exceed the limits shown in Table per Section 8.9.

RSS-Gen Section 8.9		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

7.3.1. Test Procedure Used

ANSI C63.10 Section 6.3 (General Requirements)

ANSI C63.10 Section 6.6 (Standard test method above 1GHz)

7.3.2. Test Setting

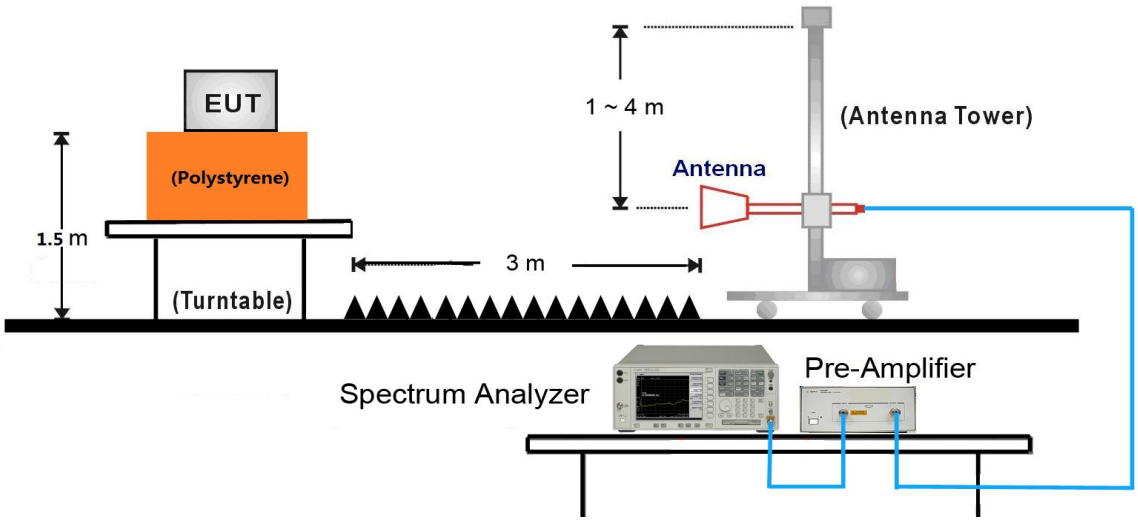
Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Measurements above 1GHz (Method VB)

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; If the EUT is configured to transmit with duty cycle ≥ 98%, set VBW = 10 Hz.
   If the EUT duty cycle is < 98%, set VBW ≥ 1/T. T is the minimum transmission duration.
4. Detector = Peak
5. Sweep time = auto
6. Trace mode = max hold
7. Trace was allowed to stabilize

7.3.3. Test Setup

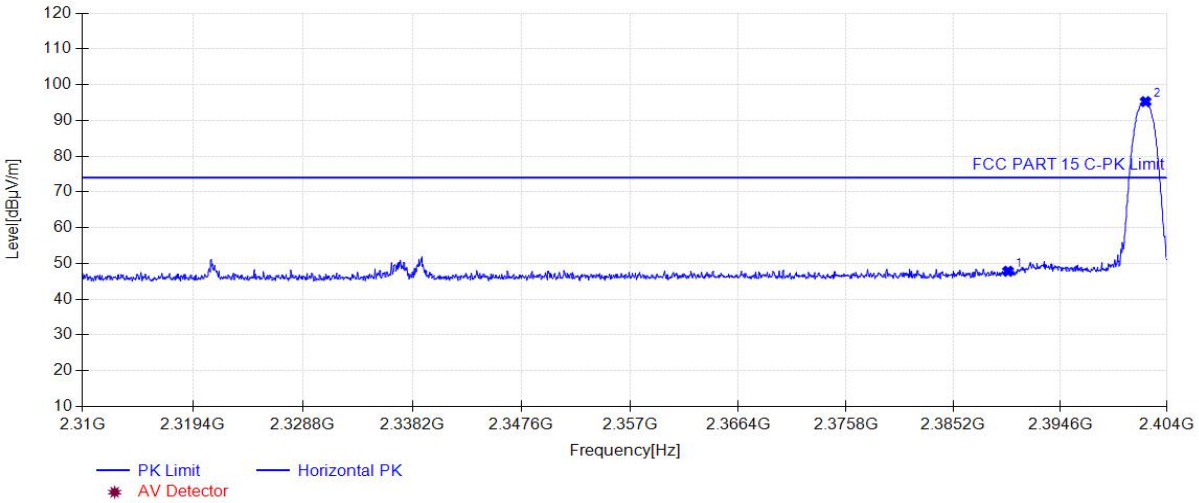


7.3.4. Test Result

Project Information			
EUT:	WYZE SPRINKLER	Model:	WSPRK1
SN:	N/A	Voltage:	AC 120V/60Hz
Environment:	Temp: 25℃; Humi:60%	Engineer:	Line Chen
Remark:	Transmit by 3DH5 at Channel 2402MHz		

Start of Test:2021-04-26 11:50:06

Test Graph

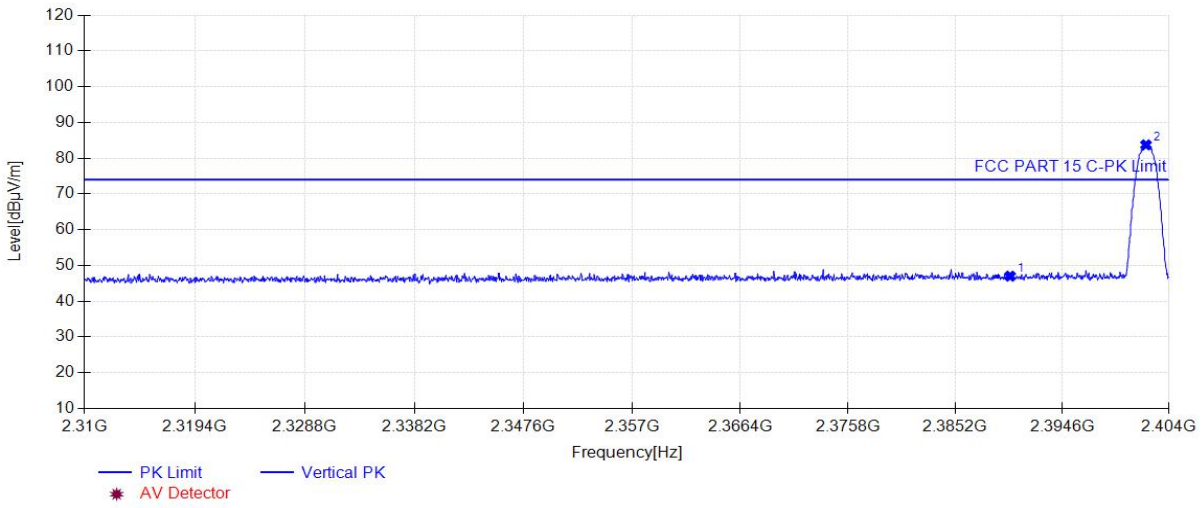


Suspected Data List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2390.00	47.81	34.25	74.00	26.19	160	54	Horizontal
2	2402.12	95.25	34.31	N/A	N/A	160	32	Horizontal

Project Information			
EUT:	WYZE SPRINKLER	Model:	WSPRK1
SN:	N/A	Voltage:	AC 120V/60Hz
Environment:	Temp: 25℃; Humi:60%	Engineer:	Line Chen
Remark:	Transmit by 3DH5 at Channel 2402MHz		

Start of Test:2021-04-26 11:51:14

Test Graph

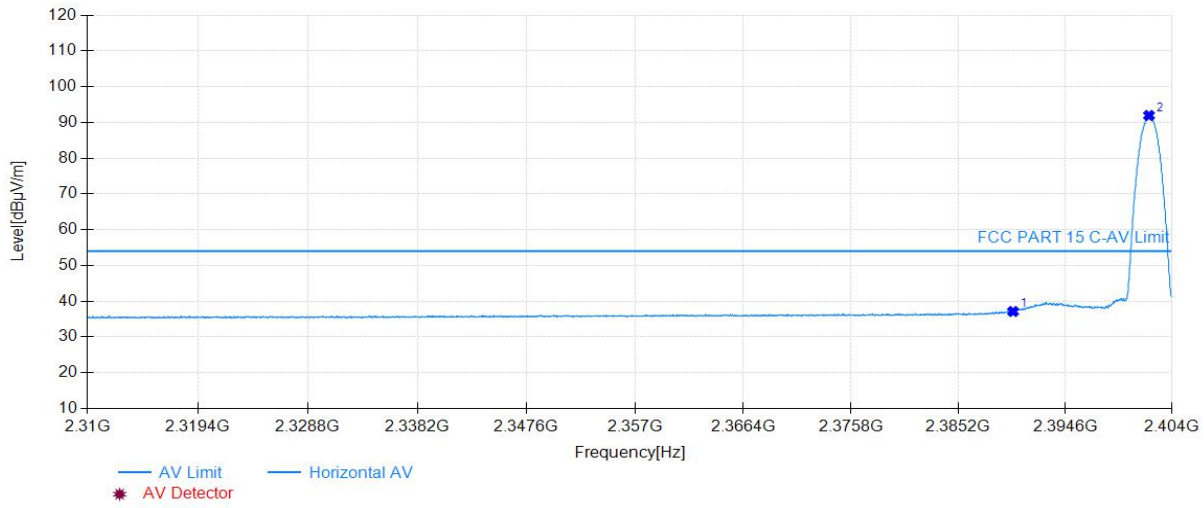


Suspected Data List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2390.00	47.00	34.25	74.00	27.00	160	357	Vertical
2	2401.97	83.71	34.31	N/A	N/A	160	21	Vertical

Project Information			
EUT:	WYZE SPRINKLER	Model:	WSPRK1
SN:	N/A	Voltage:	AC 120V/60Hz
Environment:	Temp: 25℃; Humi:60%	Engineer:	Line Chen
Remark:	Transmit by 3DH5 at Channel 2402MHz		

Start of Test:2021-04-26 13:31:49

Test Graph

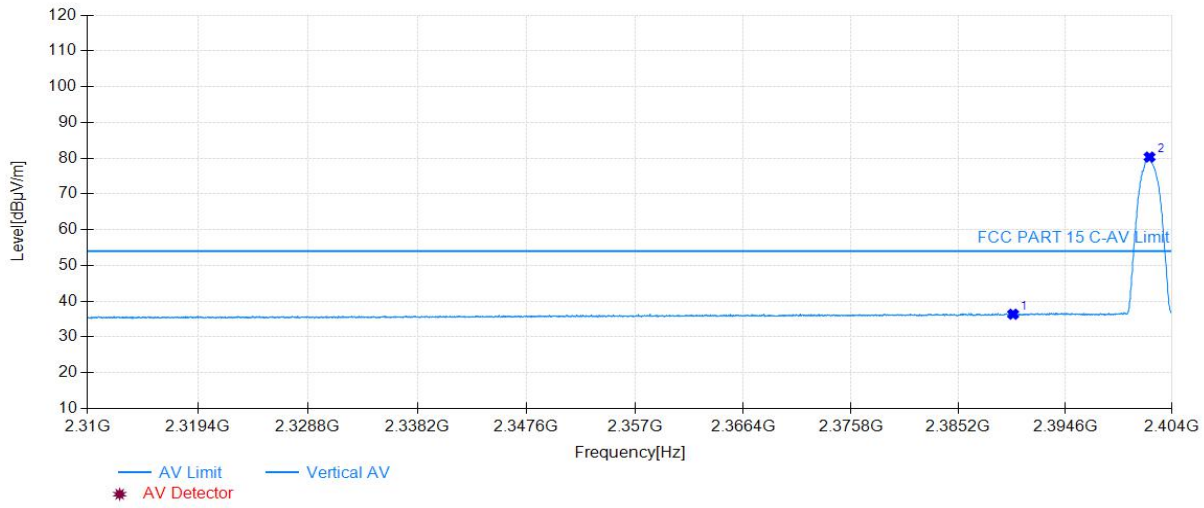


Suspected Data List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2390.00	37.12	34.25	54.00	16.88	160	351	Horizontal
2	2401.97	91.93	34.31	N/A	N/A	160	31	Horizontal

Project Information			
EUT:	WYZE SPRINKLER	Model:	WSPRK1
SN:	N/A	Voltage:	AC 120V/60Hz
Environment:	Temp: 25℃; Humi:60%	Engineer:	Line Chen
Remark:	Transmit by 3DH5 at Channel 2402MHz		

Start of Test:2021-04-26 13:35:07

Test Graph

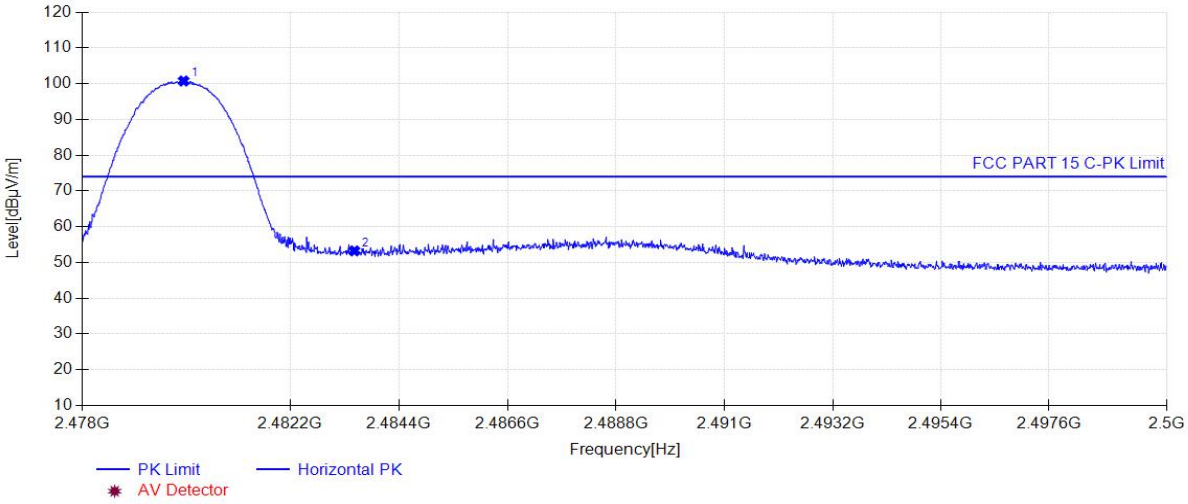


Suspected Data List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2390.00	36.36	34.25	54.00	17.64	160	220	Vertical
2	2402.02	80.31	34.31	N/A	N/A	160	17	Vertical

Project Information			
EUT:	WYZE SPRINKLER	Model:	WSPRK1
SN:	N/A	Voltage:	AC 120V/60Hz
Environment:	Temp: 25℃; Humi:60%	Engineer:	Line Chen
Remark:	Transmit by 3DH5 at Channel 2480MHz		

Start of Test:2021-04-26 16:05:04

Test Graph

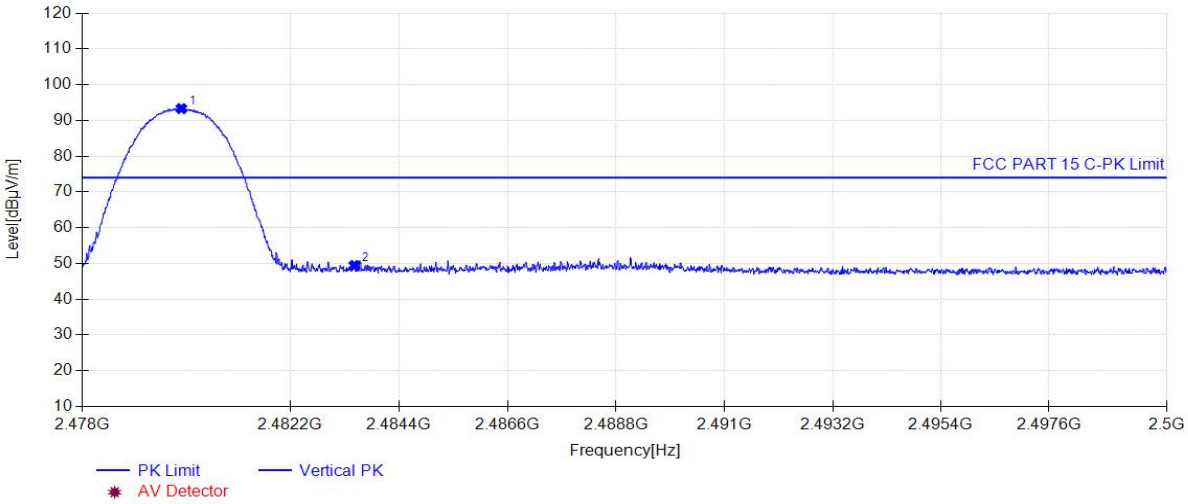


Suspected Data List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2480.04	100.74	34.64	N/A	N/A	160	47	Horizontal
2	2483.50	53.23	34.65	74.00	20.77	160	40	Horizontal

Project Information			
EUT:	WYZE SPRINKLER	Model:	WSPRK1
SN:	N/A	Voltage:	AC 120V/60Hz
Environment:	Temp: 25℃; Humi:60%	Engineer:	Line Chen
Remark:	Transmit by 3DH5 at Channel 2480MHz		

Start of Test:2021-04-26 16:06:15

Test Graph

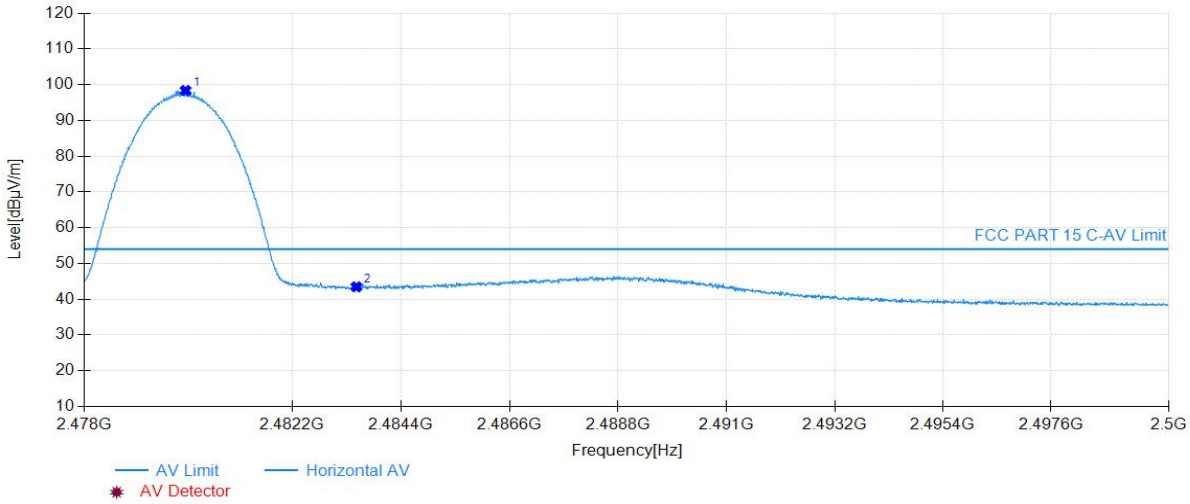


Suspected Data List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2480.00	93.29	34.64	N/A	N/A	160	274	Vertical
2	2483.50	49.43	34.65	74.00	24.57	160	290	Vertical

Project Information			
EUT:	WYZE SPRINKLER	Model:	WSPRK1
SN:	N/A	Voltage:	AC 120V/60Hz
Environment:	Temp: 25℃; Humi:60%	Engineer:	Line Chen
Remark:	Transmit by 3DH5 at Channel 2480MHz		

Start of Test:2021-04-26 16:09:52

Test Graph

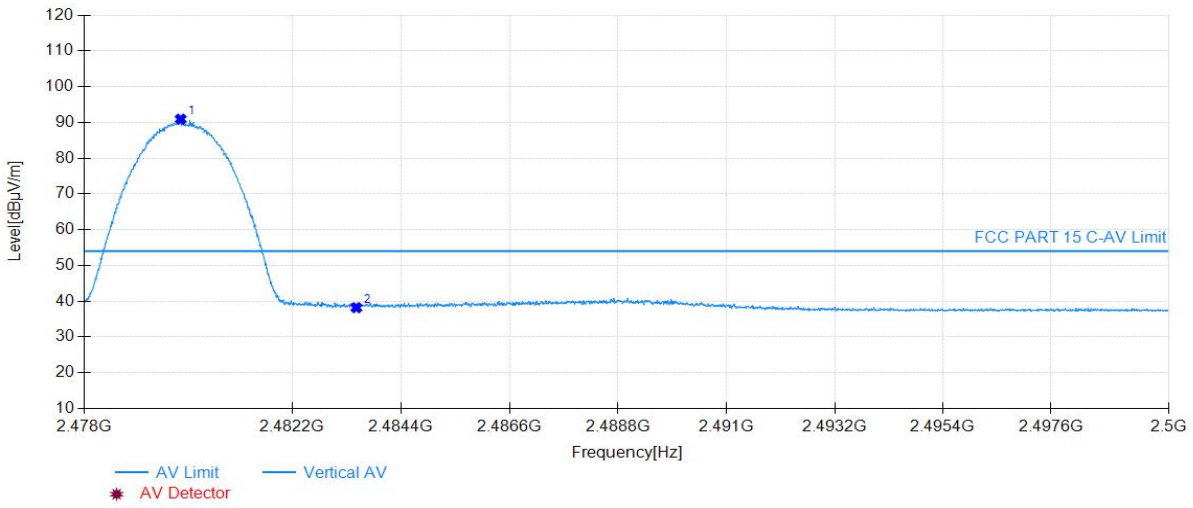


Suspected Data List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2480.04	98.38	34.64	N/A	N/A	160	49	Horizontal
2	2483.50	43.45	34.65	54.00	10.55	160	42	Horizontal

Project Information			
EUT:	WYZE SPRINKLER	Model:	WSPRK1
SN:	N/A	Voltage:	AC 120V/60Hz
Environment:	Temp: 25℃; Humi:60%	Engineer:	Line Chen
Remark:	Transmit by 3DH5 at Channel 2480MHz		

Start of Test:2021-04-26 16:11:03

Test Graph



Suspected Data List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2479.94	90.91	34.64	N/A	N/A	160	274	Vertical
2	2483.50	38.18	34.65	54.00	15.82	160	274	Vertical

8. CONCLUSION

The data collected relate only the item(s) tested and show that the **WYZE SPRINKLER CONTROLLER** is in compliance with Part 15C of the FCC and IC Rules.

The End