FCC Test Report

Report No.: AGC00970241101FR01

FCC ID	:	2AMUU-MST100
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Smart Sprinkler Timer
BRAND NAME	:	meross, Refoss, Flysocks, Meross_Smart, Refoss Smart
MODEL NAME	:	MST100
APPLICANT	:	Chengdu Meross Technology Co., Ltd.
DATE OF ISSUE	:	Dec. 12, 2024
STANDARD(S)	:	FCC Part 15 Subpart C §15.231
REPORT VERSION	:	V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Dec. 12, 2024	Valid	Initial Release

Table of Contents

1. General Information

Applicant	Chengdu Meross Technology Co., Ltd.
Address	Floor 3, Building A5, Shijicheng Road No 1129, Gaoxin, Free Trade Trial Zone, Chengdu, Sichuan, 610000, China
Manufacturer	Chengdu Meross Technology Co., Ltd.
Address	Floor 3, Building A5, Shijicheng Road No 1129, Gaoxin, Free Trade Trial Zone, Chengdu, Sichuan, 610000, China
Factory	N/A
Address	N/A
Product Designation	Smart Sprinkler Timer
Brand Name	meross, Refoss, Flysocks, Meross_Smart, Refoss Smart
Test Model	MST100
Series Model(s)	N/A
Difference Description	N/A
Date of receipt of test item	Nov. 22, 2024
Date of Test	Nov. 22, 2024 to Dec. 12, 2024
Deviation from Standard	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Test Report Form No	AGCER-FCC-SRD1-V1

Note: The test results of this report relate only to the tested sample identified in this report.

Prepared By	Jack Gui (Project Engineer)	Dec. 12, 2024
Reviewed By	Calvin Liu (Reviewer)	Dec. 12, 2024
Approved By	Angela Li (Authorized Officer)	Dec. 12, 2024

2. Product Information

2.1 Product Technical Description

Operation Frequency	434MHz-434.75MHz
Hardware Version	1.1.0
Software Version	1.1.12
Modulation Type	FSK
Number of channels	4
Field Strength of Fundamental	76.05dBuV/m(PK)@3m 68.09dBuV/m(AV)@3m
Antenna Designation	PCB Antenna
Antenna Gain	1.5dBi
Power Supply	DC 3V by battery

2.2 Test Frequency List

Frequency Band	Channel Number	Test Frequency
--	01	434MHz
--	02	434.25 MHz
--	03	434.5 MHz
--	04	434.75 MHz

Note: According to manufacturer's requirements, periodic operation in the band 40.66-40.70 MHz and above 70MHz

2.3 Related Submittal(S) / Grant (S)

This submittal(s) (test report) is intended for FCC ID: **2AMUU-MST100,** filing to comply with Part 2, Part 15 of the Federal Communication Commission rules.

2.4 Test Methodology

The tests were performed according to following standards:

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 15	Radio Frequency Devices
3	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

2.5 Special Accessories

Not available for this EUT intended for grant.

2.6 Equipment Modifications

Not available for this EUT intended for grant.

2.7 Antenna Requirement

Standard Requirement
15.203 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, 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.
EUT Antenna:
The non-detachable antenna inside the device cannot be replaced by the user at will. The gain of the antenna is 1.5dBi.

3. Test Environment

3.1 Address of The Test Laboratory

Laboratory: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L5488

Attestation of Global Compliance (Shenzhen) Co., Ltd. has been assessed and proved to follow CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories.)

A2LA-Lab Cert. No.: 5054.02

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to follow ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC-Registration No.: 975832

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files with Registration 975832.

IC-Registration No.: 24842(CAB identifier: CN0063)

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.

3.3 Environmental Conditions

	Normal Conditions
Temperature range (℃)	15 - 35
Relative humidity range	20 % - 75 %
Pressure range (kPa)	86 - 106
Power supply	DC 3V by battery

3.4 Measurement Uncertainty

The reported uncertainty of measurement y ±U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

Item	Measurement Uncertainty
Uncertainty of Conducted Emission for AC Port	U_c = ±2.9 dB
Uncertainty of Radiated Emission below 150kHz	U_c = ±4.2 dB
Uncertainty of Radiated Emission below 30MHz	U_c = ±3.8 dB
Uncertainty of Radiated Emission below 1GHz	U_c = ±3.9 dB
Uncertainty of total RF power, conducted	U_c = ±0.8 dB
Uncertainty of RF power density, conducted	U_c = ±2.6 dB
Uncertainty of spurious emissions, conducted	U_c = ±2 %
Uncertainty of Occupied Channel Bandwidth	U_c = ±2.7 %
Uncertainty of Dwell Timee	U_c =+0.2 %

3.5 List of Equipment Used

● Radiated Spurious Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☐	AGC-EM-E046	EMI Test Receiver	R&S	ESCI	10096	2024-02-01	2025-01-31
☒	AGC-EM-E116	EMI Test Receiver	R&S	ESCI	100034	2024-05-24	2025-05-23
☒	AGC-EM-E061	Spectrum Analyzer	Agilent	N9010A	MY53470504	2024-05-28	2025-05-27
☒	AGC-EM-E086	Loop Antenna	ZHINAN	ZN30900C	18051	2024-03-05	2026-03-04
☒	AGC-EM-E001	Wideband Antenna	SCHWARZBECK	VULB9168	D69250	2023-05-11	2025-05-10
☒	AGC-EM-E029	Broadband Ridged Horn Antenna	ETS	3117	00034609	2024-03-31	2025-03-30
☒	AGC-EM-E082	Horn Antenna	SCHWARZBECK	BBHA 9170	#768	2023-09-24	2025-09-23
☒	AGC-EM-E146	Pre-amplifier	ETS	3117-PA	00246148	2024-07-24	2026-07-23
☒	AGC-EM-A119	2.4G Filter	SongYi	N/A	N/A	2024-05-23	2025-05-22
☒	AGC-EM-A138	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2025-06-08
☐	AGC-EM-A139	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2025-06-08

● AC Power Line Conducted Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☐	AGC-EM-E045	EMI Test Receiver	R&S	ESPI	101206	2024-05-28	2025-05-27
☐	AGC-EM-A130	6dB Attenuator	Eeatsheep	LM-XX-6-5W	DC-6GZ	2023-06-09	2025-06-08
☐	AGC-EM-E023	AMN	R&S	100086	ESH2-Z5	2024-05-28	2025-05-27

● Test Software					
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Version Information
☐	AGC-EM-S001	CE Test System	R&S	ES-K1	V1.71
☐	AGC-EM-S003	RE Test System	FARA	EZ-EMC	V.RA-03A
☒	AGC-EM-S004	RE Test System	Tonscend	TS$^+$ Ver2.1(JS32-RE)	4.0.0.0
☐	AGC-ER-S012	BT/WIFI Test System	Tonscend	JS1120-2	2.6
☒	AGC-EM-S011	RSE Test System	Tonscend	TS+-Ver2.1(JS36-RSE)	4.0.0.0

4. System Test Configuration

4.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

4.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

4.3 Configuration of Tested System

Radiated Emission Configure:

4.4 Equipment Used in Tested System

The following peripheral devices and interface cables were connected during the measurement:

☐ Test Accessories Come From The Laboratory

No.	Equipment	Model No.	Manufacturer	Specification Information	Cable
1	--	--	--	--	--

☐ Test Accessories Come From The Manufacturer

No.	Equipment	Model No.	Manufacturer	Specification Information	Cable
1	--	--	--	--	--

4.5 Summary of Test Results

Item	FCC Rules	Description Of Test	Result
1	§15.203	Antenna Equipment	Pass
2	§15.231(a)	Provision for Momentary Operation	Pass
3	§15.231	Field Strength of Fundamental	Pass
4	§15.209	Radiated Emission	Pass
5	§15.205(a)	Restricted Bands of Operation	Pass
6	§15.231(c)	-20dB Bandwidth	Pass
7	§15.207	AC Power Line Conducted Emission	N/A

Note: 1. N/A means not applicable

2. The device under test is battery-powered and does not require evaluation of AC Power Line Conducted Emission.

5. Description of Test Modes

Summary table of Test Cases	
Test Item	Equipment Type / Modulation
	Short Range Wireless Device/ FSK
Radiated & Conducted Test Cases	Mode 1: Normal Transmission Operation at 434.00MHz Mode 2: Normal Transmission Operation at 434.25MHz Mode 3: Normal Transmission Operation at 434.75MHz
AC Conducted Emission	N/A

Note:

1. Only the result of the worst case was recorded in the report, if no other cases.
2. The battery is full-charged during the test.
3. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
4. For Conducted Test method, a temporary antenna connector is provided by the manufacture.
5. EUT is a A transmitter activated automatically.
6. The EUT is in normal firmware working state when testing Transmission Time.When testing other test items, the EUT reaches the maximum dutycycle and maximum transmit power through special firmware.

6. Provision for Momentary Operation

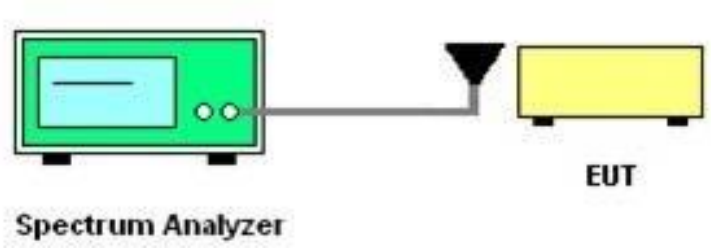
6.1 Provisions Applicable

☐ (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
☒ (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.
☐ (3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.
☐ (4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition.
☐ (5) Transmission of set-up information for security systems may exceed the transmission duration limits in (1) and (2) above, provided such transmission are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

6.2 Measurement Procedure

1. Set the parameters of SPA as below:
2. Centre frequency = Operation Frequency
3. RBW=1MHz, VBW=3MHz Span: 0Hz Sweep time: 1s
4. Set the EUT to transmit by manually operated. Use the “View” function of SPA to find the transmission time of being released.
5. Record the data and Reported.

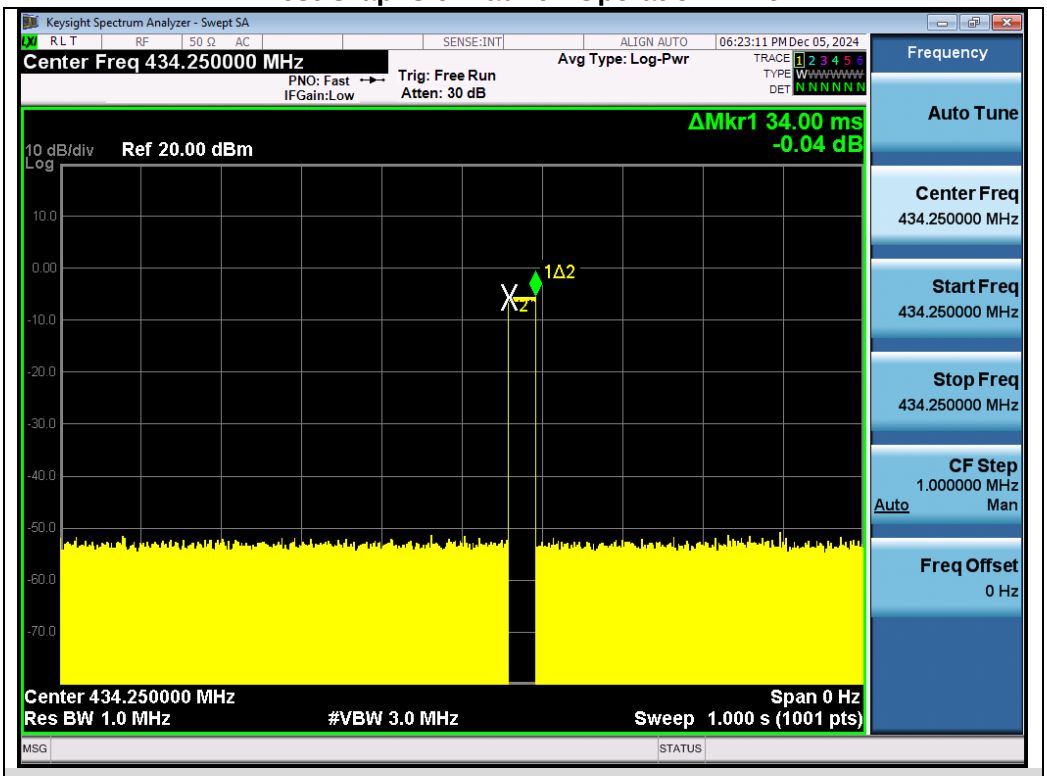
6.3 Measurement Setup (Block Diagram of Configuration)



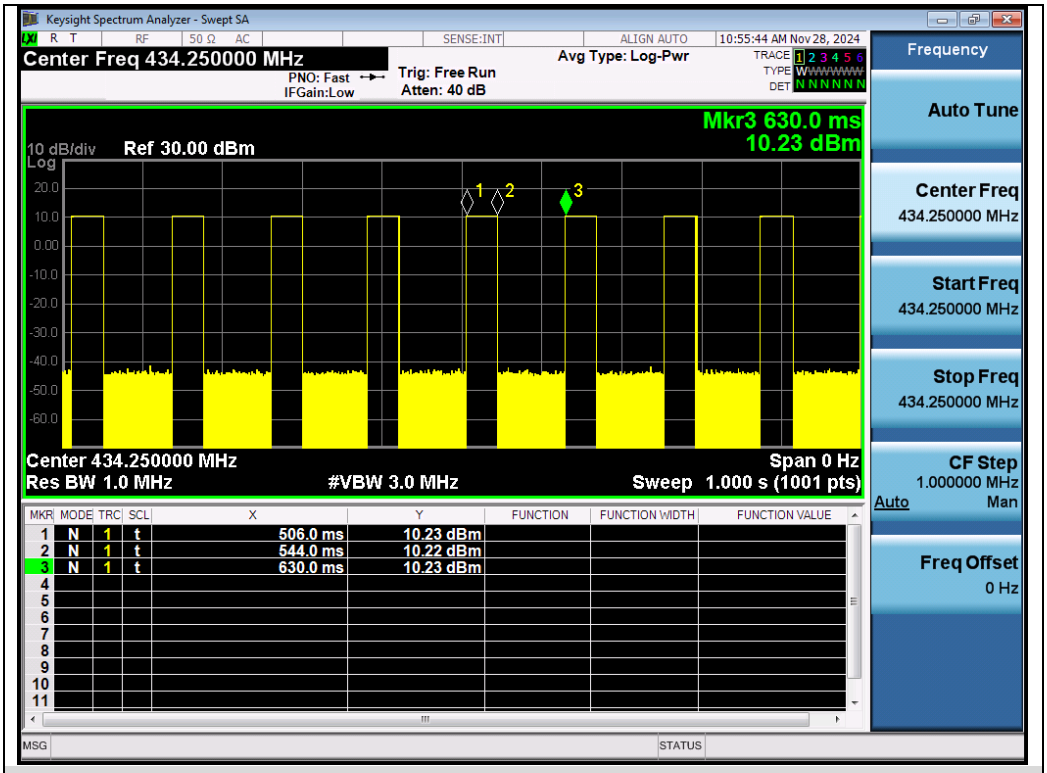
6.4 Measurement Result

Test Mode	Test Channel (MHz)	Each transmission time (s)	Each transmission time Limits	Silent period between transmissions time (s)	Silent period between transmissions Limits	Pass or Fail
FSK	434.25	0.034	＜1s	0.086	＜5s	Pass

Test Graphs of Launch Operation Time



Test_Graph_ ANT1_434.25MHz_FSK_ Launch Operation Time



Test_Graph_ ANT1_434.25MHz_FSK_ Launch Operation Time

7. Duty Cycle of Correction Factor

7.1 Provisions Applicable

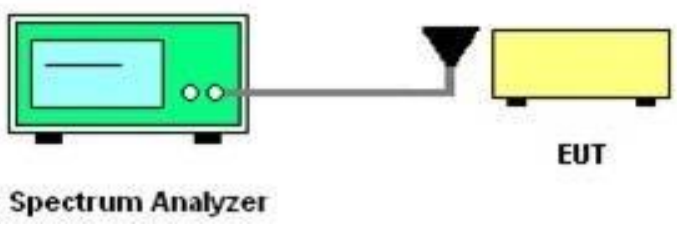
According to FCC Part 15.231 (b)(2) and 15.35 (c), For pulse operation transmitter, the averaging pulsed emissions are calculated by peak value of measured emission plus duty cycle factor.

7.2 Measurement Procedure

After the antenna of the EUT is connected, the output signal of the EUT is received by the connected test antenna
To the spectrum analyzer. Set the center frequency to the actual working frequency of the EUT, and then set the spectrum analyzer to Zero Span for
Release time reading. During the test, the switch is released and the EUT is automatically closed

1. Set the parameters of SPA as below:
   Centre frequency = Operation Frequency
   RBW=1MHz, VBW=3MHz
   Span: 0Hz
   Sweep time: more than two pulse trains or more than each type of pulse occupancy time
2. Set the EUT to transmit by manually operated. Use the “Delta mark” function of SPA to find the period time between two pulse trains and each type of pulse occupancy time.
3. Record the plots and Reported.

7.3 Measurement Setup (Block Diagram of Configuration)

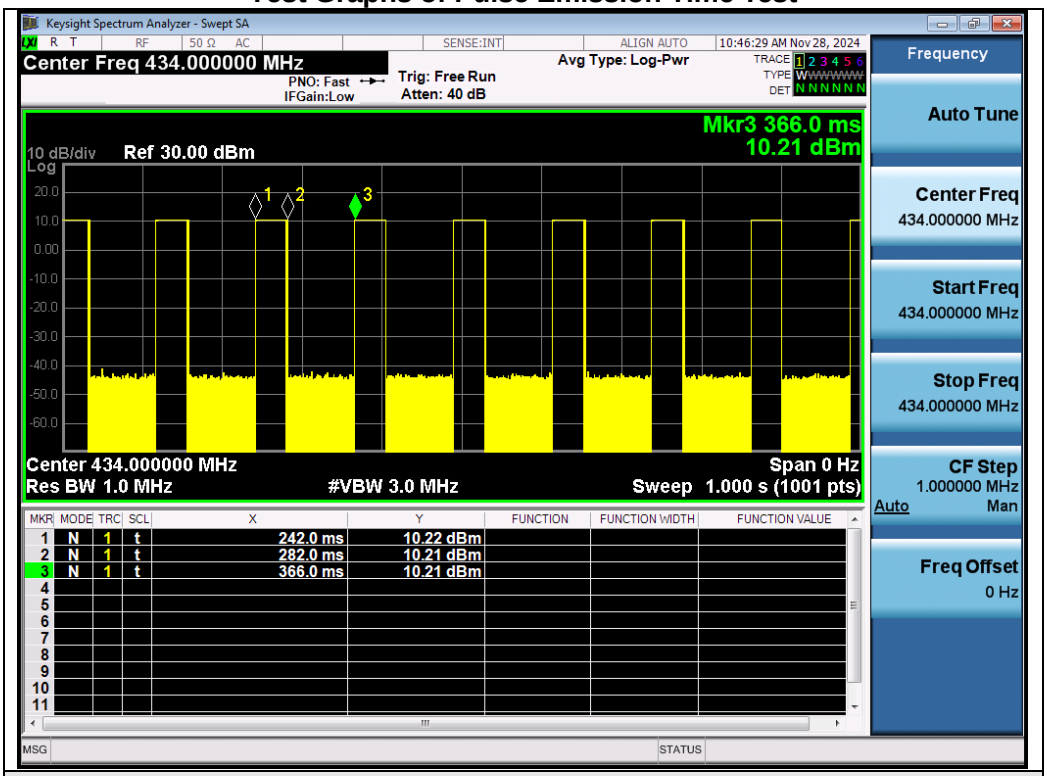


7.4 Measurement Result

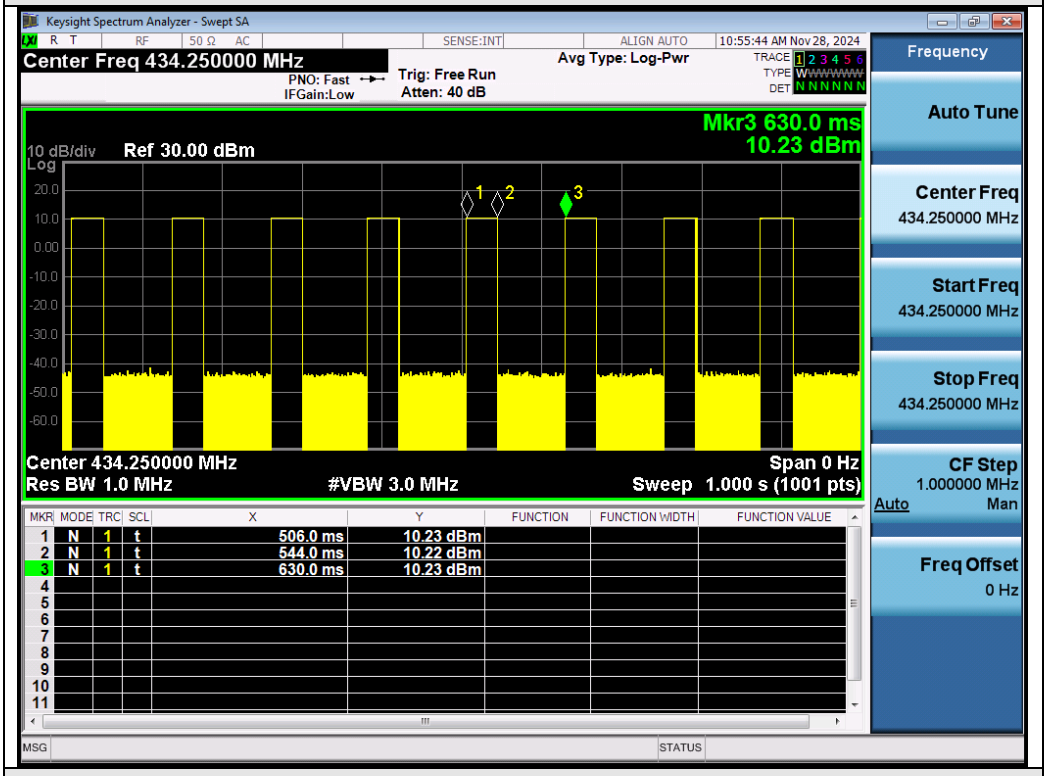
Test Channel (MHz)	Test Period (Ton) (ms)	Test Period (Total) (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
434	40	100	40	-7.96
434.25	38	100	38	-8.40
434.5	40	100	40	-7.96
434.75	38	100	38	-8.40

Note 1: Duty Cycle Factor=20 log (Duty Cycle)
Note 2: The maximum reference value of the test cycle is 100ms.

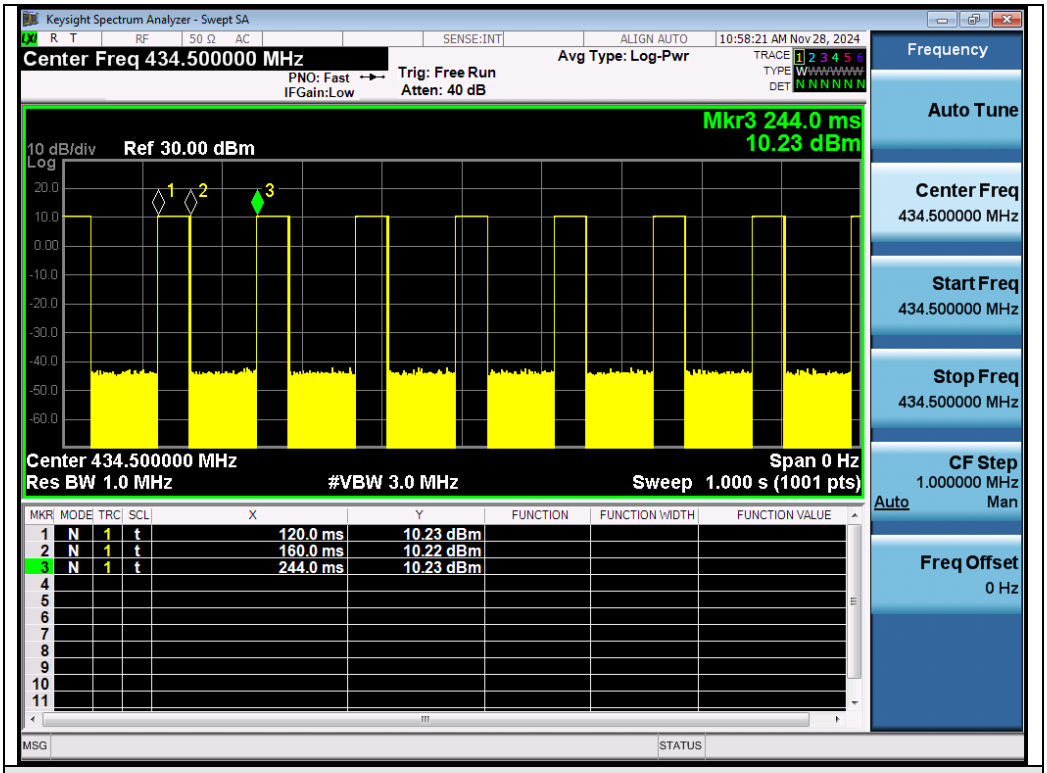
Test Graphs of Pulse Emission Time Test



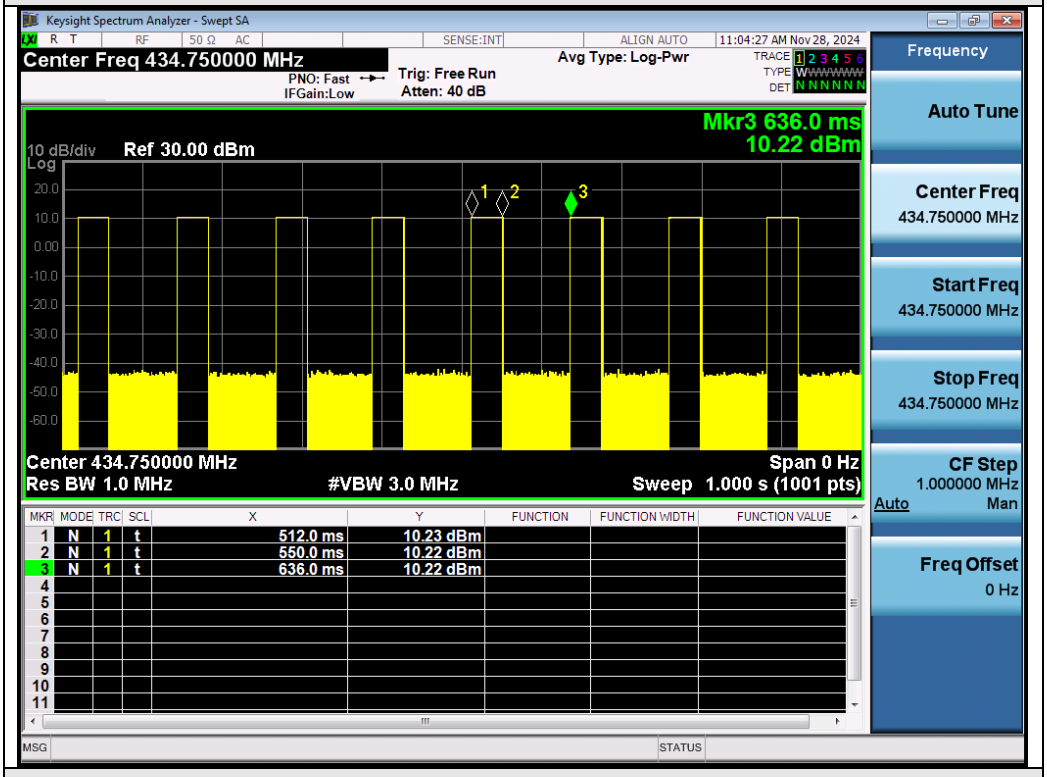
Test_Graph_FSK_ANT1_434_Pulse



Test_Graph_FSK_ANT1_434.25_Pulse



Test_Graph_FSK_ANT1_434.5_Pulse



Test_Graph_FSK_ANT1_434.75_Pulse

8. Field Strength of Fundamental and Radiated Emission

8.1 Provisions Applicable

15.209 Limit in the below table has to be followed:

Frequency (MHz)	Distance Meters	Field Strengths Limit	
		μV/m	dBμV/m
0.009 ~ 0.490	300	2400/F(kHz)	---
0.490 ~ 1.705	30	24000/F(kHz)	---
1.705 ~ 30	30	30	---
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Remark:
1) Emission level dBμV = 20 log Emission level μV/m
2) The smaller limit shall apply at the cross point between two frequency bands
3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

Note: All modes were tested for restricted band radiated emission, the test records reported below are the worst result compared to other modes.

15.231(b) Limit in the below table has to be followed:

Fundamental Frequency	Field Strength of Fundamental (microvolts/meter)	Field Strength of Harmonics (microvolts/meter)
40.66-40.70MHz	2250	225
70-130MHz	1250	125
130-174MHz	1250 to 3750	125 to 375
174-260MHz	3750	375
260-470MHz	3750 to 12500	375 to 1250
Above 470MHz	12500	1250

15.231(e) Limit in the below table has to be followed:

Fundamental Frequency	Field Strength of Fundamental (microvolts/meter)	Field Strength of Harmonics (microvolts/meter)
40.66-40.70MHz	1000	100
70-130MHz	500	50
130-174MHz	500 to 1500	50 to 150
174-260MHz	1500	150
260-470MHz	1500 to 5000	150 to 500
Above 470MHz	5000	500

8.2 Measurement Procedure

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.

9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

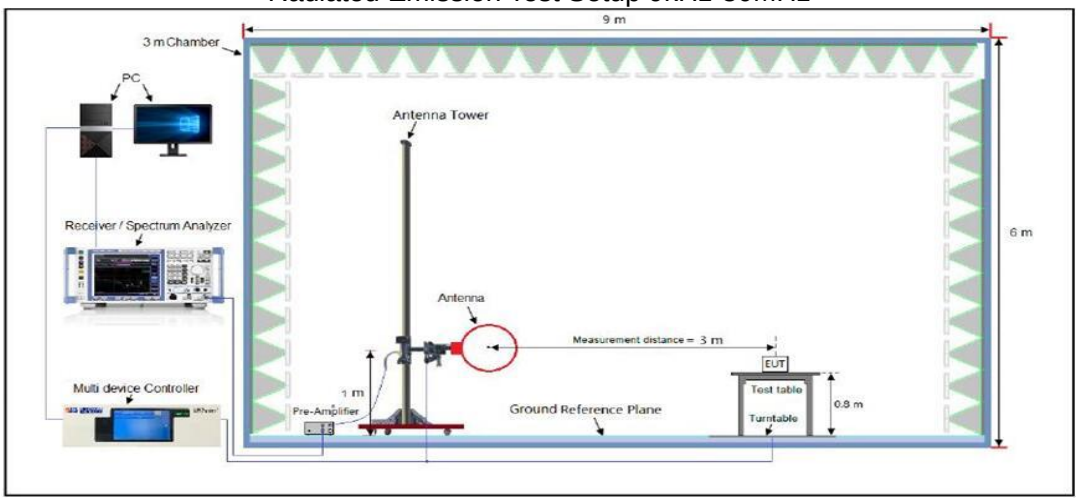
The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Test Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/3MHz for Peak, 1MHz/3MHz for Average

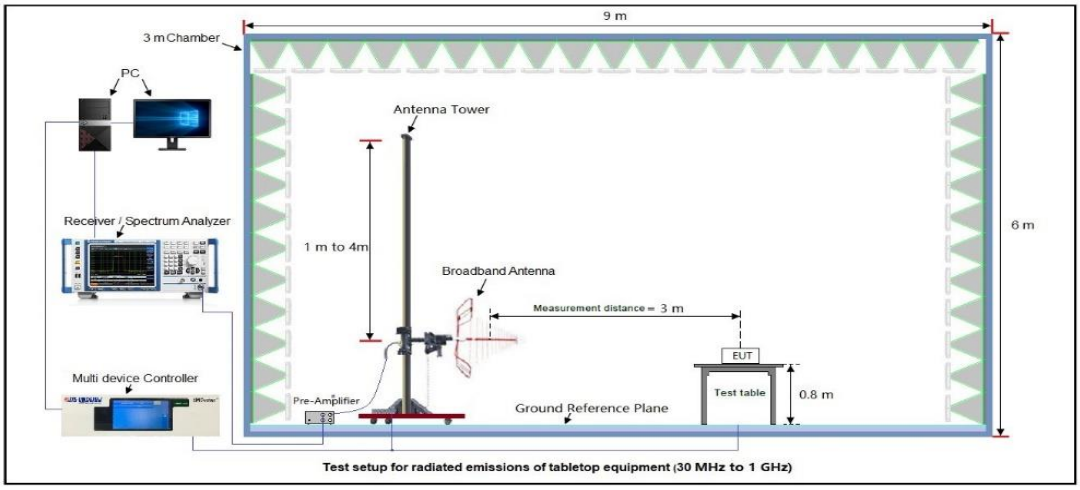
Receiver Parameter	Test Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

8.3 Measurement Setup (Block Diagram of Configuration)

Radiated Emission Test Setup 9kHz-30MHz

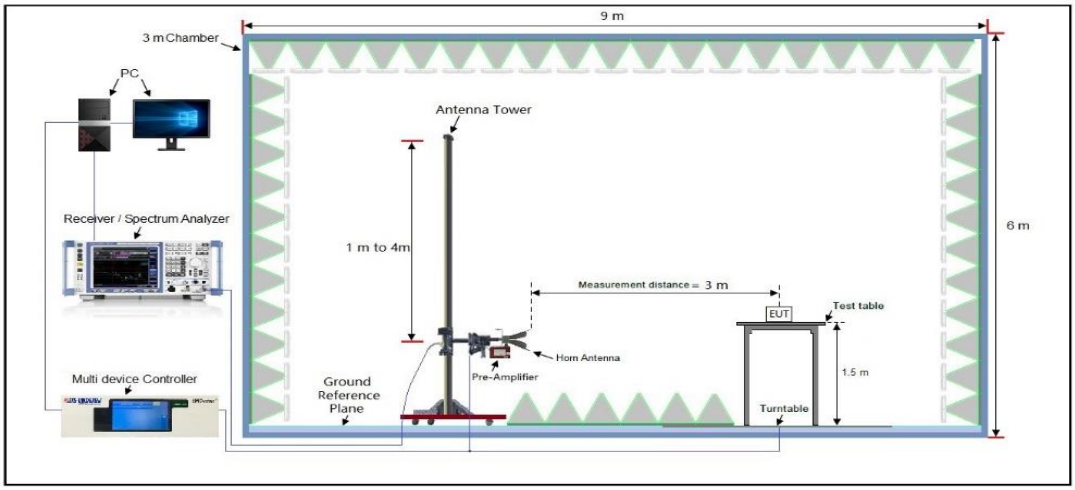


Radiated Emission Test Setup 30MHz-1000MHz



Test setup for radiated emissions of tabletop equipment (30 MHz to 1 GHz)

Radiated Emission Test Setup Above 1000MHz



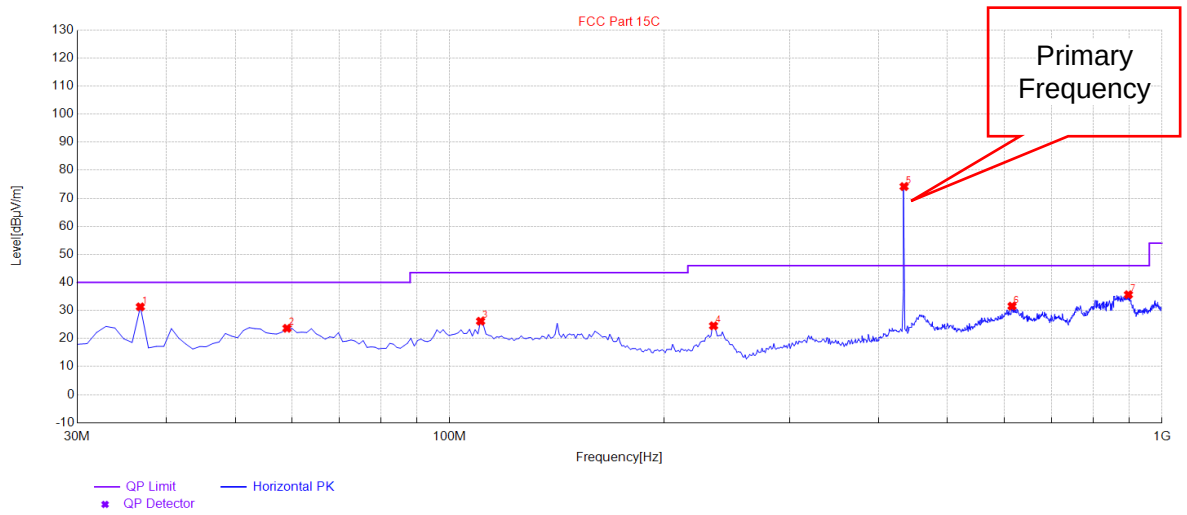
8.4 Measurement Result

Radiated Emission from 9kHz~30MHz

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

Radiated Emission from 30MHz~1000MHz

EUT Name	Smart Sprinkler Timer	Model Name	MST100
Temperature	23.6° C	Relative Humidity	58.9 %
Pressure	960hPa	Test Voltage	DC 3V by battery
Test Mode	Mode 3	Antenna	Horizontal



Suspected Data List_ Peak Detection

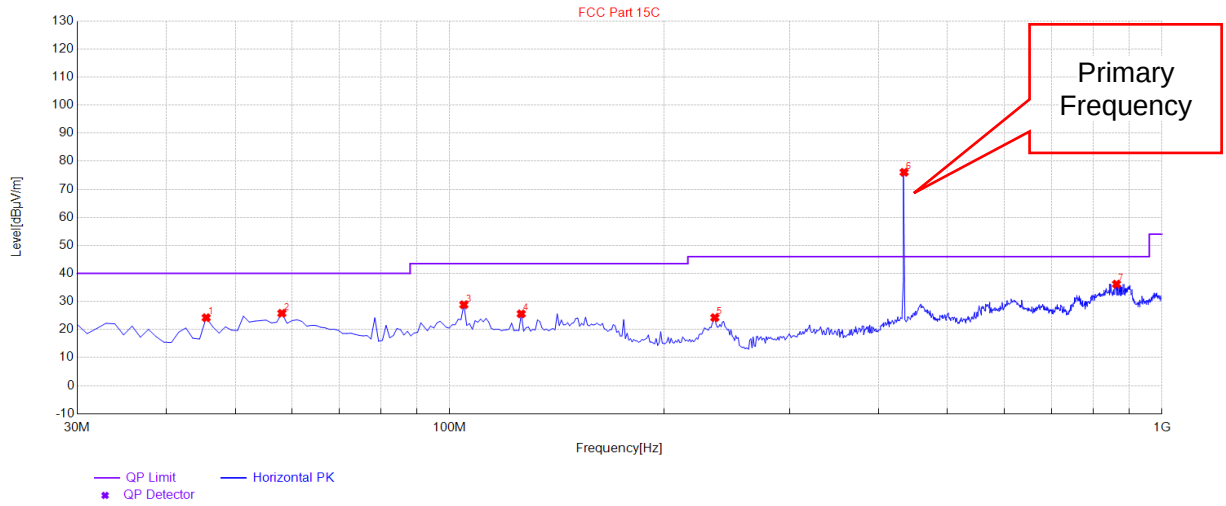
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	36.79	31.29	11.23	40.00	8.71	150	288	Horizontal
2	59.1	23.64	17.65	40.00	16.36	150	332	Horizontal
3	110.51	26.17	16.50	43.50	17.33	150	10	Horizontal
4	234.67	24.53	15.03	46.00	21.47	150	299	Horizontal
5	434.75	74.17	19.06	92.90	-28.17	150	349	Horizontal
6	615.88	31.55	25.47	46.00	14.45	150	238	Horizontal
7	897.18	35.64	30.16	46.00	10.36	150	210	Horizontal

Final data result_ Average Detection

NO.	Freq. [MHz]	PK Level [dBµV/m]	Duty cycle factor(dB)	AV Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Polarity
1	434.75	74.17	-7.96	66.21	80.85	-14.64	Horizontal

RESULT: PASS

EUT Name	Smart Sprinkler Timer	Model Name	MST100
Temperature	23.6° C	Relative Humidity	58.9 %
Pressure	960hPa	Test Voltage	DC 3V by battery
Test Mode	Mode 3	Antenna	Vertical



Suspected Data List_ Peak Detection

NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	45.52	24.21	12.99	40.00	15.79	150	322	Vertical
2	58.13	25.79	17.38	40.00	14.21	150	322	Vertical
3	104.69	28.83	16.83	43.50	14.67	150	351	Vertical
4	126.03	25.60	15.64	43.50	17.90	150	205	Vertical
5	235.64	24.25	15.23	46.00	21.75	150	5	Vertical
6	434.75	76.05	19.06	92.90	-30.05	150	360	Vertical
7	863.23	36.19	29.91	46.00	9.81	150	277	Vertical

Final data result_ Average Detection

NO.	Freq. [MHz]	PK Level [dBµV/m]	Duty cycle factor(dB)	AV Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Polarity
1	434.75	76.05	-7.96	68.09	80.85	-12.76	Vertical

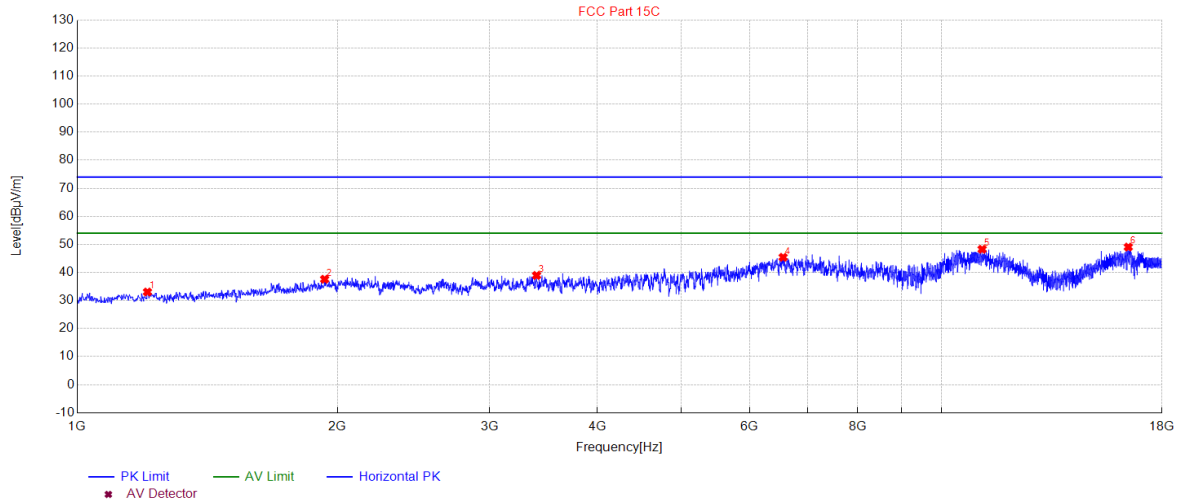
RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. All test modes had been pre-tested. The mode 3 is the worst case and recorded in the report.

Radiated Emission from Above 1GHz

EUT Name	Smart Sprinkler Timer	Model Name	MST100
Temperature	23.6° C	Relative Humidity	58.9 %
Pressure	960hPa	Test Voltage	DC 3V by battery
Test Mode	Mode 3	Antenna	Horizontal



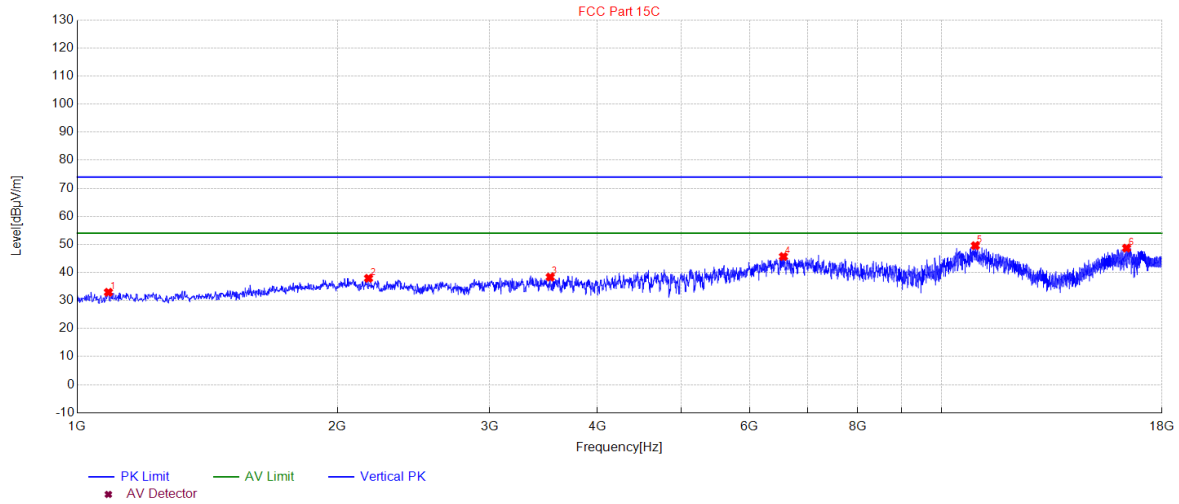
Suspected Data List_ Peak Detection

NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1205.720572	33.03	-18.02	74.00	40.97	150	180	Horizontal
2	1933.393339	37.57	-13.96	74.00	36.43	150	260	Horizontal
3	3400.640064	38.92	-10.91	74.00	35.08	150	170	Horizontal
4	6559.555956	45.40	-4.38	74.00	28.60	150	200	Horizontal
5	11146.614662	48.26	2.38	74.00	25.74	150	240	Horizontal
6	16454.545455	49.05	5.56	74.00	24.95	150	310	Horizontal

RESULT: PASS

Radiated Emission from Above 1GHz

EUT	Smart Sprinkler Timer	**Model Name**	MST100
Temperature	23.6° C	**Relative Humidity**	58.9 %
Pressure	960hPa	**Test Voltage**	DC 3V by battery
Test Mode	Mode 3	**Antenna**	Vertical



Suspected Data List_ Peak Detection

NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1086.708671	32.92	-18.20	74.00	41.08	150	230	Vertical
2	2173.117312	37.91	-12.99	74.00	36.09	150	50	Vertical
3	3526.452645	38.34	-10.60	74.00	35.66	150	250	Vertical
4	6564.656466	45.65	-4.37	74.00	28.35	150	170	Vertical
5	10945.9946	49.53	2.48	74.00	24.47	150	260	Vertical
6	16379.737974	48.67	5.45	74.00	25.33	150	50	Vertical

RESULT: PASS

Note:

1. The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.
2. Factor = Antenna Factor + Cable loss - Amplifier gain, Margin=Measure result-Limit.
3. The “Factor” value can be calculated automatically by software of measurement system.

9. -20dB Bandwidth Measurement

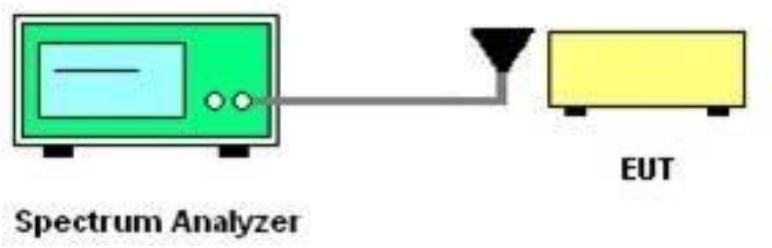
9.1 Provisions Applicable

According to FCC Part 15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier

9.2 Measurement Procedure

1. Set the parameters of SPA as below:
2. Centre frequency = Operation Frequency
3. RBW=3kHz, VBW=10kHz
4. Span: 300kHz
5. Sweep time: Auto
6. Set the EUT to continue transmitting mode. Allow the trace to stabilize. Use the “N dB down” function of SPA to define the bandwidth.
7. Record the plots and Reported.

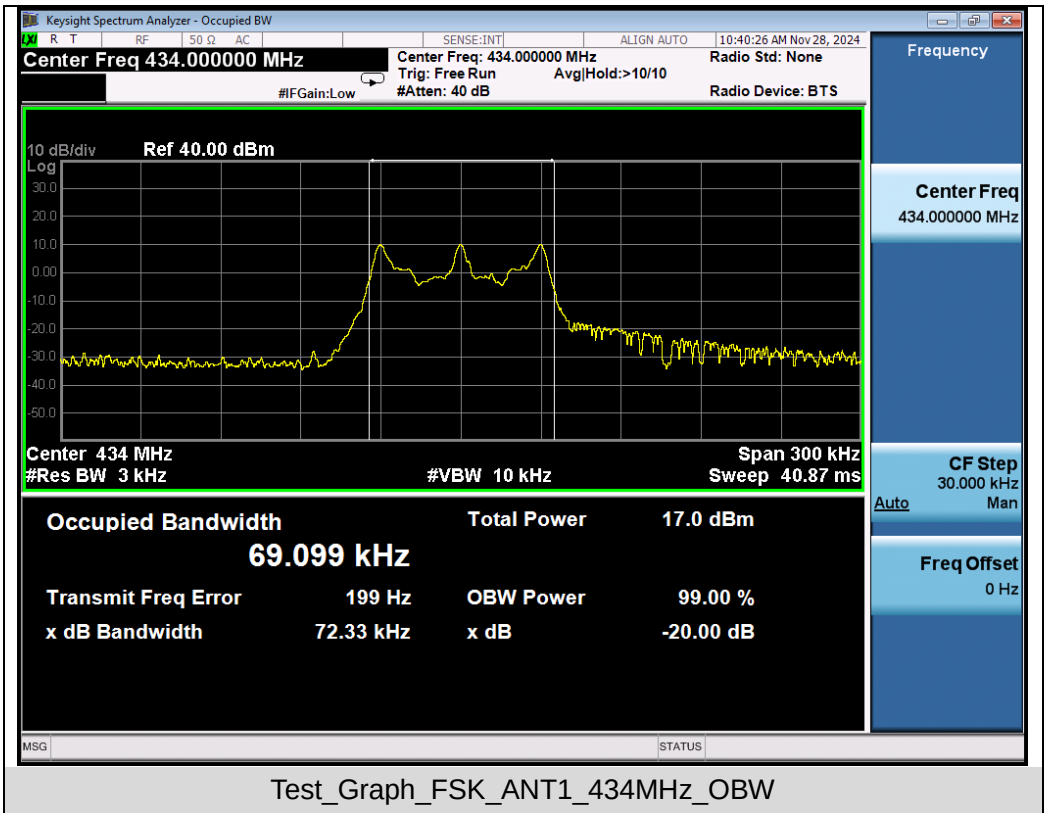
9.3 Measurement Setup (Block Diagram of Configuration)



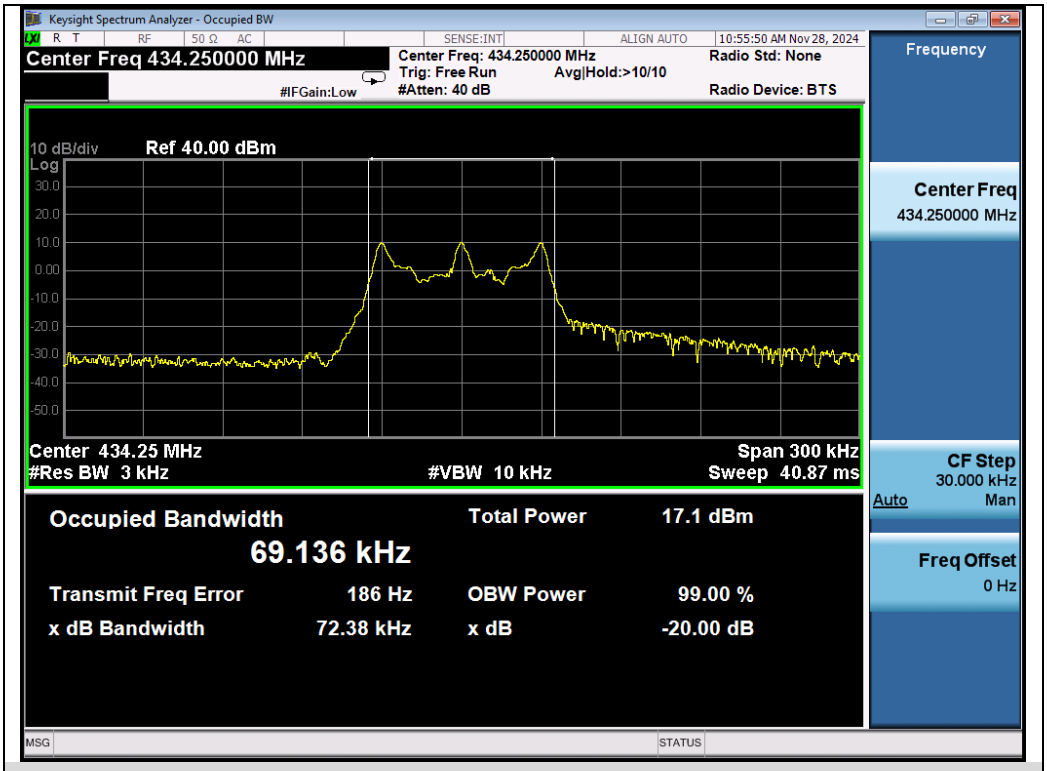
9.4 Measurement Result

Test Data of Bandwidth Measurement					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (kHz)	-20dB Bandwidth (kHz)	Limits (kHz)	Pass or Fail
FSK	434	69.099	72.33	108.50	Pass
FSK	434.25	69.136	72.38	106.06	Pass
FSK	434.5	69.139	72.36	108.63	Pass
FSK	434.75	69.096	72.28	108.69	Pass
Note: Limit= Operation Frequency ×0.25%					

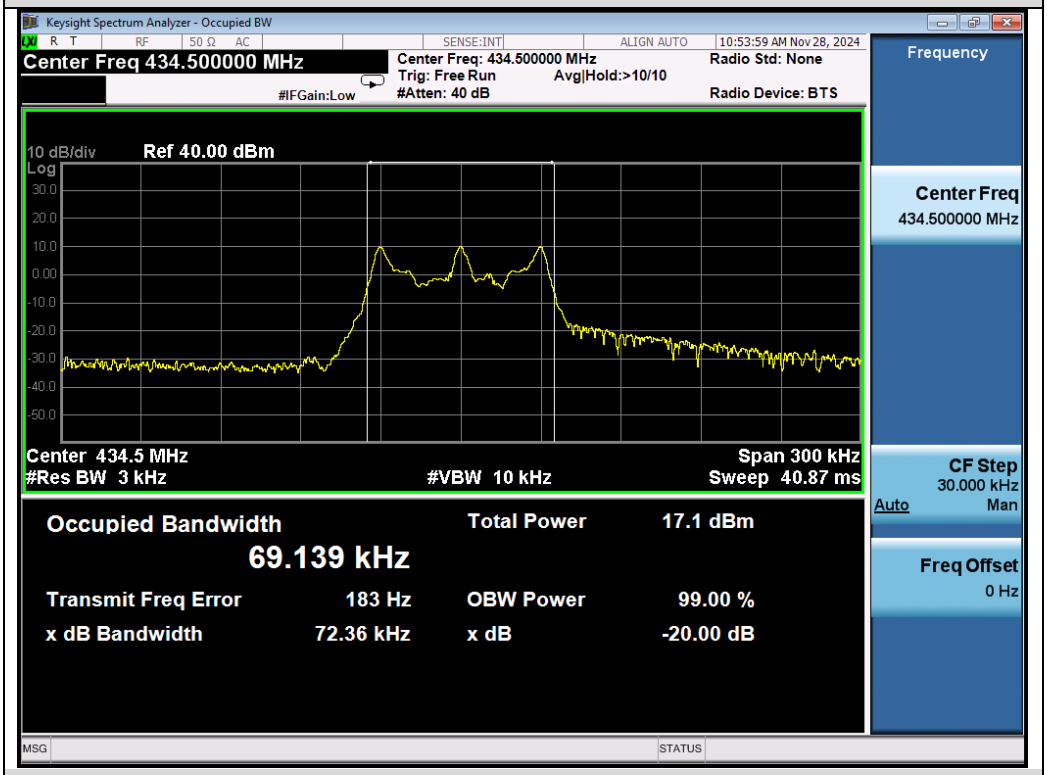
Test Graphs of Occupied Bandwidth and -20dB Bandwidth



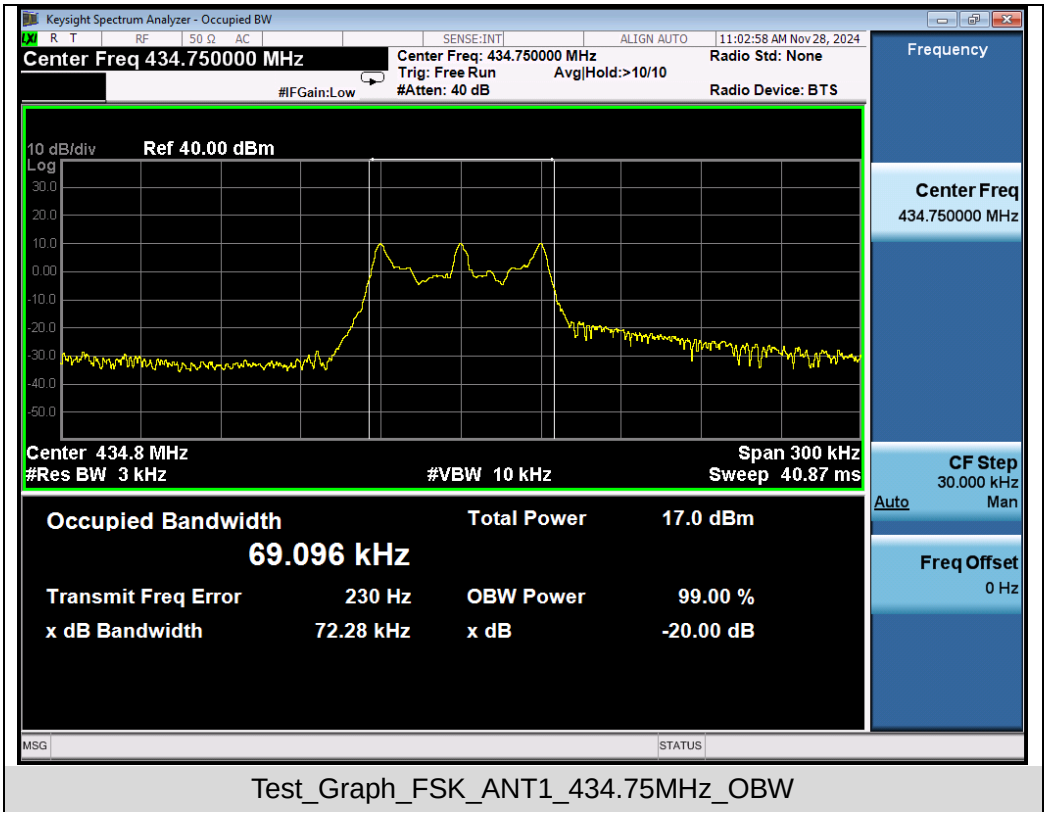
Test_Graph_FSK_ANT1_434MHz_OBW



Test_Graph_FSK_ANT1_434.25MHz_OBW



Test_Graph_FSK_ANT1_434.5MHz_OBW



Test_Graph_FSK_ANT1_434.75MHz_OBW

10. AC Power Line Conducted Emission Test

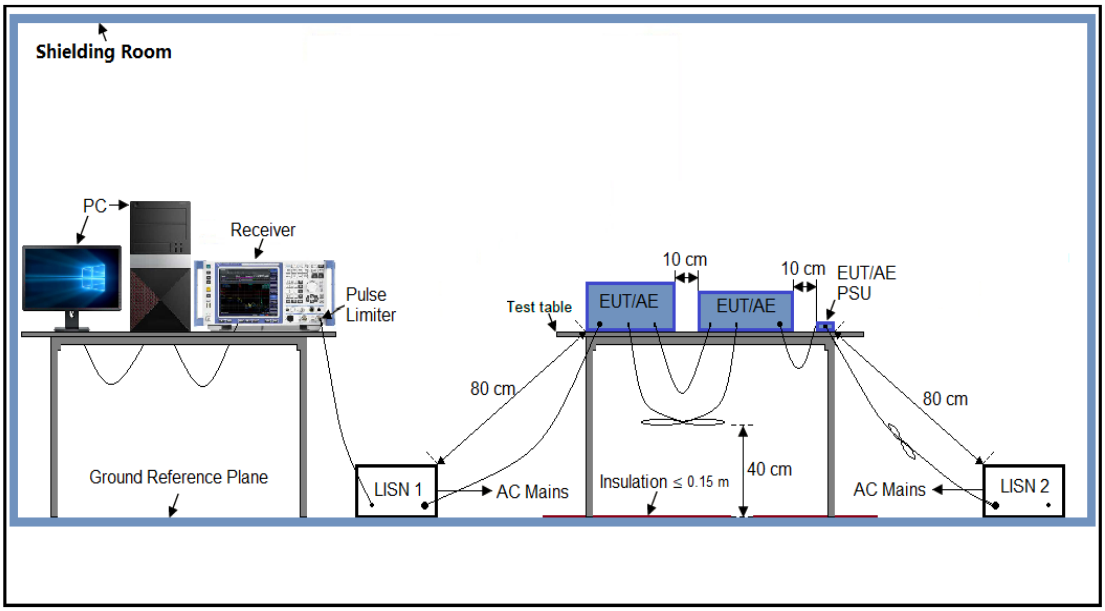
10.1 Measurement Limit

Frequency Range	Maximum RF Line Voltage	
	Q.P. (dBμV)	Average (dBμV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz

10.2 Measurement Setup (Block Diagram of Configuration)



10.3 Preliminary Procedure of Line Conducted Emission Test

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipment received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC 3V power from battery.
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

10.4 Final Procedure of Line Conducted Emission Test

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

10.5 Measurement Result

Not Applicable

Note: This device is battery powered, there is no AC power supply

APPENDIX I: PHOTOGRAPHS OF TEST SETUP

Refer to the Report No.: AGC00970241101AP01

APPENDIX II: PHOTOGRAPHS OF TEST EUT

Refer to the Report No.: AGC00970241101AP02

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

Conditions of Issuance of Test Reports

1. All samples and goods are accepted by the Attestation of Global Compliance (Shenzhen) Co., Ltd (the "Company") solely for testing and reporting in accordance with the following terms and conditions. The company provides its services on the basis that such terms and conditions constitute express agreement between the company and any person, firm or company requesting its services (the "Clients").

2. Any report issued by Company as a result of this application for testing services (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.

3.The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.

4. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.

5. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.

6. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.

7.Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.

8. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.

9. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.