

FCC/IC - TEST REPORT

Report Number : **68.910.19.0021.01** Date of Issue: February 27, 2020

Model : MT01-1328-069001, MT01-1328-069002

Product Type : Tubular motor

Applicant : Rollease Acmeda Inc

Address : 750 East Main Street, 7th Floor, Stamford Connecticut
: United States 06902

Production Facility : Ningbo Dooya Mechanic & Electronic Technology Co., Ltd.

Address : No.168 Shengguang Road, Luotuo, Zhenhai, Ningbo,
: Zhejiang province, P.R.China 315202

Test Result : **n Positive** **o Negative**

Total pages including
Appendices : 19

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2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park,
Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052,
P. R. China

FCC Registration Number: 514049

IC Registration Number: 10320A

Telephone: 86 755 8828 6998
Fax: 86 755 8828 5299

3 Description of the Equipment Under Test

Product:	Tubular motor
Model no./HVIN/PMN:	MT01-1328-069001, MT01-1328-069002
FCC ID:	2AGGZMT011328069001
IC:	21769-MT011328001
Rating:	5VDC, 15W, 1.25A (Supplies by USB Port) 10.8V, 2600mAh (Supplied By rechargeable battery)
RF Transmission Frequency:	433.925MHz
Modulation:	FSK
Antenna Type:	Line Antenna
Antenna Gain:	0dBi
Description of the EUT:	The Equipment Under Test (EUT) is a Tubular motor operated at 433.925MHz

4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2019 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators
RSS-Gen Issue 5 March 2019 Amendment 1	General Requirements and Information for the Certification of Radio Apparatus
RSS-210 Issue 10 December 2019	RSS-210 — Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

All the test methods were according to ANSI C63.10-2013.

5 Summary of Test Results

Technical Requirements					
FCC Part 15 Subpart C, RSS-210 Issue 10					
Test Condition			Pages	Test Site	Test Result
§15.207	RSS-GEN A8.8	Conducted emission AC power port	10	Site 1	Pass
§15.205, §15.209, 15.35 (c)§15.231(b)	RSS-210 A.1.2	Radiated Emission, 30MHz to 4.5GHz	13	Site 1	Pass
§15.231(c)	RSS-210 A.1.3	Bandwidth Measurement	16	Site 1	Pass
§15.231(a)(1)	RSS-210 A.1.1(a)	Deactivation Time	17	Site 1	Pass
§15.203	RSS-Gen 6.8	Antenna requirement	--	See Note 2	Pass

Note 1: N/A=Not Applicable.

Note 2: The EUT uses a Line Antenna, which gain is 0dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2AGGZMT011328069001, IC: 21769-MT011328001 complies with Section 15.205, 15.207, 15.209, 15.231 of the FCC Part 15, Subpart C Rules, RSS-Gen Issue 5 and RSS-210 issue 10.

Two models are identical except for different model name and software. the software will not affect the transmission power. So all the tests were applied on MT01-1328-069001, other models are deemed to fulfil the EMC test without further testing.

SUMMARY:

All tests according to the regulations cited on page 5 were

n - Performed

o - **Not** Performed

The Equipment Under Test

n - **Fulfills** the general approval requirements.

o - **Does not** fulfill the general approval requirements.

Sample Received Date: March 28, 2019

Testing Start Date: March 28, 2019

Testing End Date: April 15, 2019

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch

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7 Systems test configuration

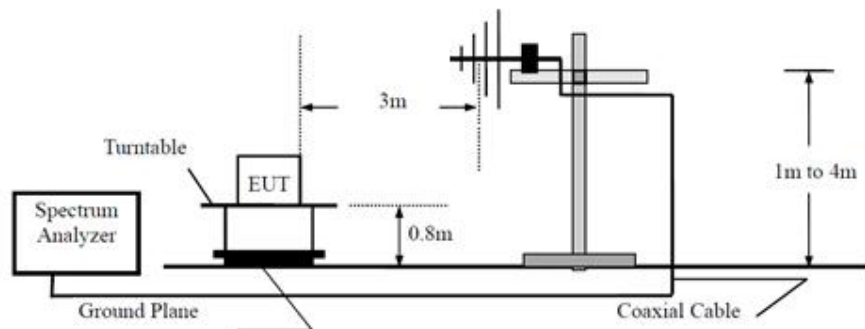
Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
--	--	--	--

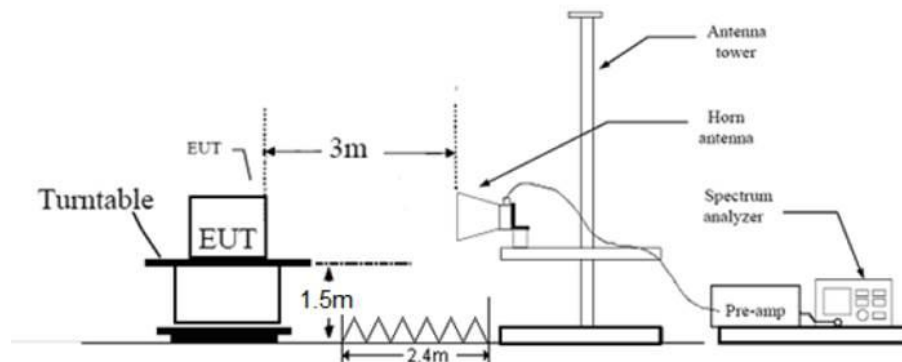
8 Test Setups

8.1 Radiated test setups

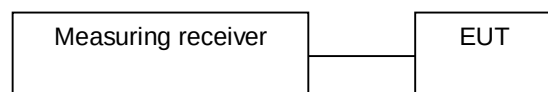
Below 1GHz



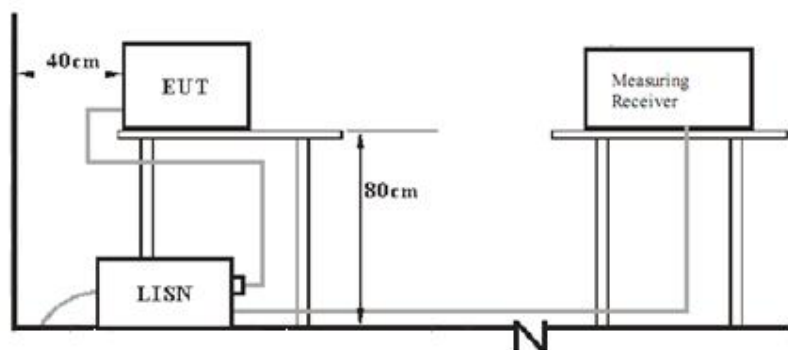
Above 1GHz



8.2 Conducted RF test setups



8.3 AC Power Line Conducted Emission test setups



9 Test Methodology

9.1 Conducted Emission

Test Method

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

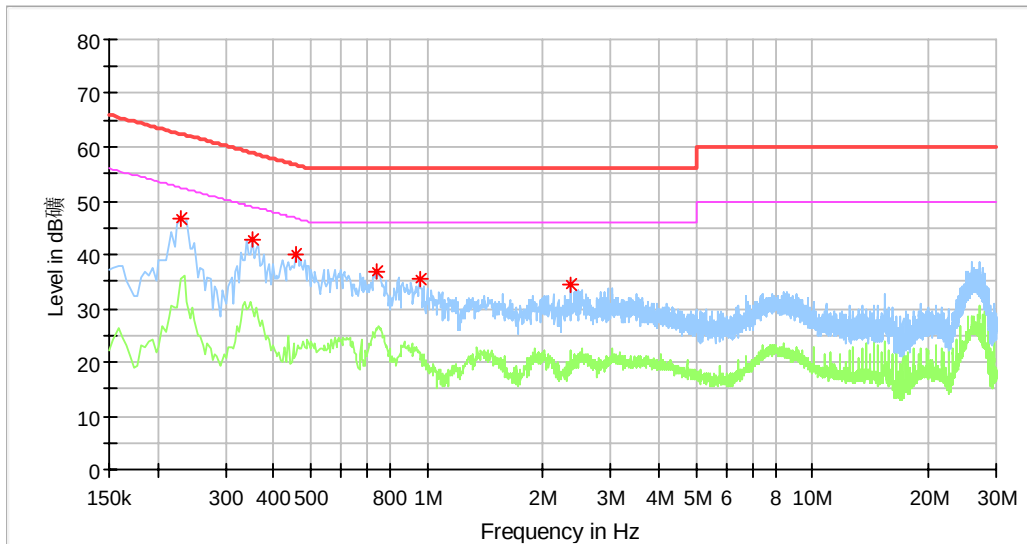
Limit

Frequency MHz	QP Limit dB μ V	AV Limit dB μ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

*Decreasing linearly with logarithm of the frequency.

Conducted Emission Test 0.15MHz – 30MHz

EUT: Tubular motor
M/N: MT01-1328-069001
Operating Condition: TX
Test Specification: Power Line, Live
Comment: AC120V/60Hz



Critical Freqs

Frequency (MHz)	MaxPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB/m)
0.230000	46.81	---	62.45	15.64	L1	10.2
0.354000	42.81	---	58.87	16.05	L1	10.2
0.458000	40.11	---	56.73	16.62	L1	10.3
0.742000	36.80	---	56.00	19.20	L1	10.3
0.958000	35.45	---	56.00	20.55	L1	10.3
2.358000	34.24	---	56.00	21.76	L1	10.3

Remark :

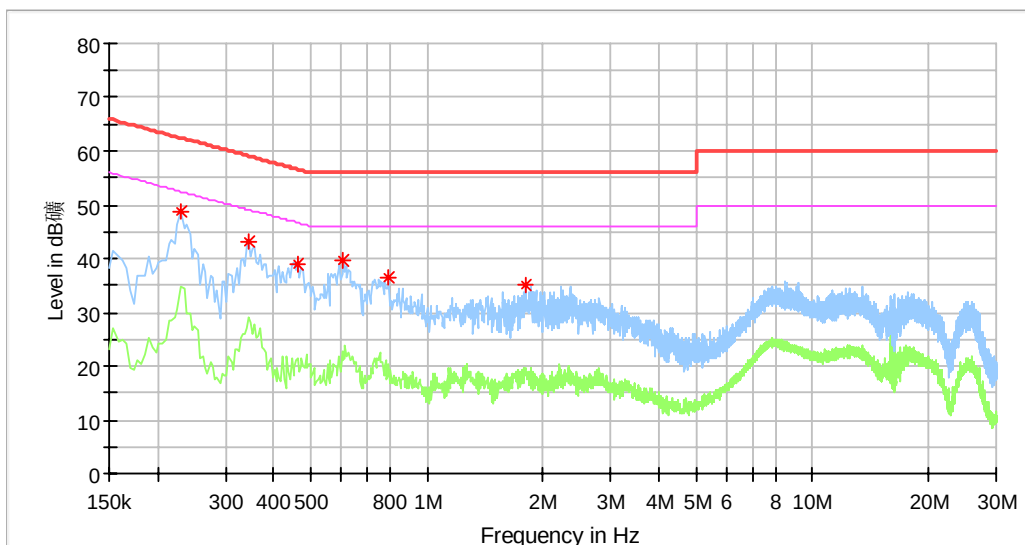
Level=Reading Level + Correction Factor

Correction Factor=Cable Loss + LISN Factor

(The Reading Level is recorded by software which is not shown in the sheet)

Conducted Emission Test 0.15MHz – 30MHz

EUT: Tubular motor
M/N: MT01-1328-069001
Operating Condition: TX
Test Specification: Power Line, Neutral
Comment: AC120V/60Hz



Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB/m)
0.230000	48.68	---	62.45	13.77	N	10.2
0.346000	43.22	---	59.06	15.84	N	10.3
0.462000	38.95	---	56.66	17.71	N	10.3
0.606000	39.64	---	56.00	16.36	N	10.3
0.794000	36.41	---	56.00	19.59	N	10.3
1.802000	34.97	---	56.00	21.03	N	10.3

Remark :

Level=Reading Level + Correction Factor

Correction Factor=Cable Loss + LISN Factor

(The Reading Level is recorded by software which is not shown in the sheet)

9.2 Radiated Emission

Test Method

- 1: The EUT was placed on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
- 3: The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4: For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- 5: Use the following spectrum analyzer settings According to C63.10:

For Above 1GHz

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 1MHz, VBW $\geq$ 3RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Below 1GHz

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 KHz, VBW $\geq$ 3RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

Note:

- 1: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.
- 2: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for peak detection (PK) at frequency above 1GHz.
- 3: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (duty cycle $\geq$ 98%) for peak detection at frequency above 1GHz
- 4: If the emission is pulsed (duty cycle $<$ 98%), modify the unit for continuous operation: use the settings shown above, then correct the reading by subcontracting the peak to average duty cycle correction factor $20\log(\text{duty cycle})$, derived from the appropriate duty cycle calculation.

Limit

According to §15.231 (b), the and RSS-210 A.1.2 field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field Strength of Fundamental (Microvolts /meter)	Field Strength of spurious emissions ((Microvolts /meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	1,250 to 3,370 *	125 to 375 *
174-260	3,750	375
260-470 √	3,750 to 12, 500*	375 to 1,250*
Above 470	12,500	1,250

Spurious radiated emissions for transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Radiated Emission									
Value	Emissions Frequency MHz	E-Field Polarity	PK Emission dBμV/m	Corr.	Average Factor dB	AV Emission dBμV/m	Limit dBμV/m	Margin	Emission Type
Below 1GHz									
PK	433.925	H	92.40	-23.3	0.00	/	100.83	8.43	Fundamental
AV	433.925	H	92.40	/	-22.29	70.11	80.83	10.72	Fundamental
PK	433.925	V	79.07	-23.3	0.00	/	100.83	21.76	Fundamental
AV	433.925	V	79.07	/	-22.29	56.78	80.83	24.05	Fundamental
PK	869.85	H	67.55	-16.0	0.00	/	80.83	13.28	Spurious
AV	869.85	H	67.55	/	-22.29	45.26	60.83	15.57	Spurious
PK	869.85	V	45.91	-16.0	0.00	/	80.83	34.92	Spurious
AV	869.85	V	45.91	/	-22.29	23.62	60.83	37.21	Spurious
Above 1GHz									
PK	3471.4	H	43.12	-0.5	0.00	/	74.00	30.88	Spurious
AV	3471.4	H	43.12	/	-22.29	20.83	54.00	33.17	Spurious
PK	1301.78	V	40.49	-11.9	0.00	/	74.00	33.51	Spurious
AV	1301.78	V	40.49	/	-22.29	18.20	54.00	35.80	Spurious

Remark:

1: AV Emission Level= PK Emission Level+20log(dutycycle)

2: Data of measurement within this frequency range shown "/" in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.

3: "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

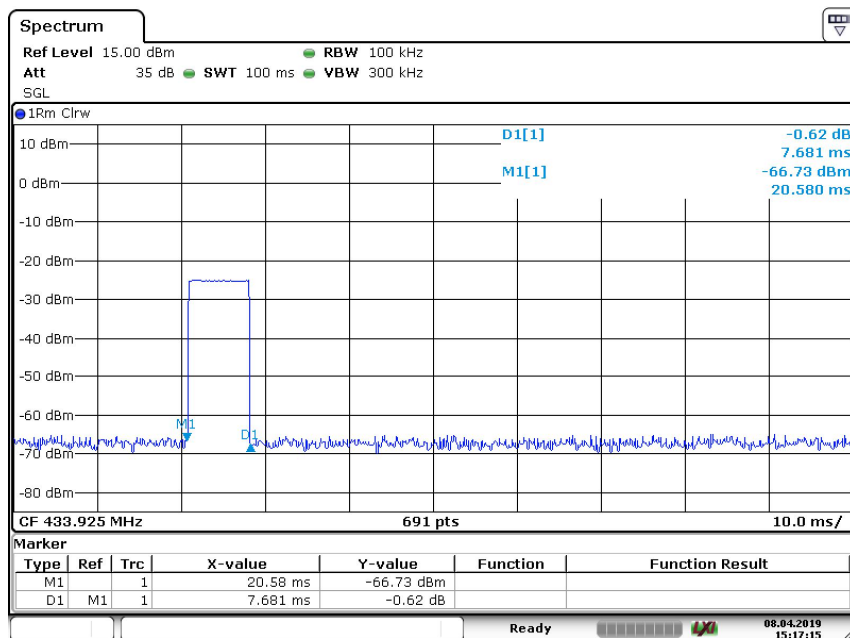
4: Level= Reading Level + Correction Factor

Correction Factor = Antenna Factor + Cable Loss- Amplifier Gain

(The Reading Level is recorded by software which is not shown in the sheet)

Duty Cycle =20.58(ms)/100(ms) =7.681%

Duty Cycle Factor =20log (Duty Cycle) =-22.29



Date: 8.APR.2019 15:17:15

9.3 Bandwidth Measurement

Test Method

1. The EUT was placed on 0.8m height table, the RF output of EUT was connected to the test receiver by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Use the following test receiver settings:
Span = approximately 5 times the 20dB bandwidth, centered on a hopping channel
RBW > the 20dB bandwidth of the emission being measured, VBW ≥ RBW,
Sweep = auto, Detector function = peak, Trace = max hold
4. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth. Record the results.
5. Repeat above procedures until all frequencies measured were complete.

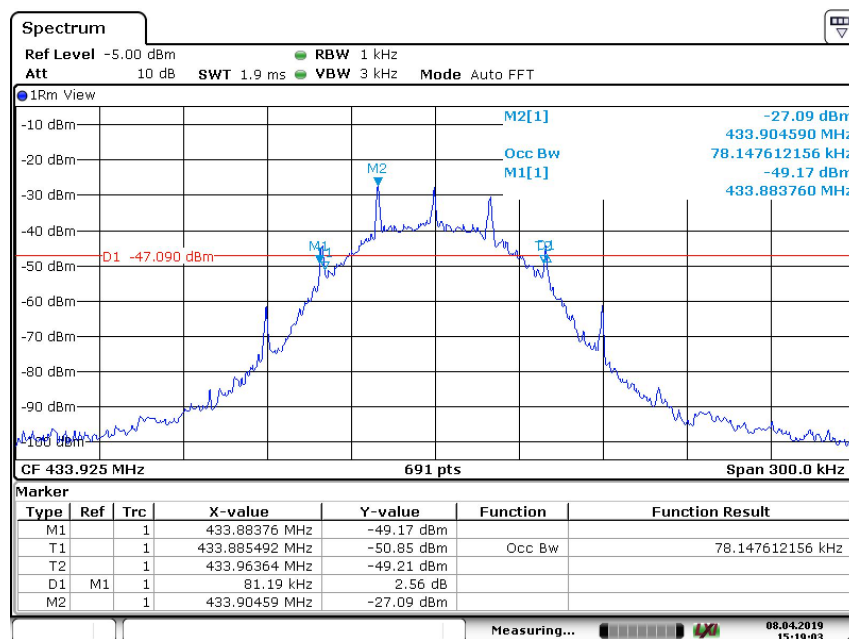
Limit

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. For devices operating above 900MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20dB down from the modulated carrier.

The limit for the EUT = 0.25% * 433.925 MHz = 1084 kHz

Test Result

Channel	20dB Bandwidth (KHz)	99% bandwidth (KHz)	Limit (KHz)
1	81.19KHz	78.15	1084



Date: 8.APR.2019 15:19:04

9.4 Deactivation Time

Test Method

1. The EUT was placed on 0.8m height table, the RF output of EUT was connected to the test receiver by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT in transmitting mode.
3. Set center frequency of spectrum analyzer=operating frequency.
4. Set the spectrum analyzer as $RBW \geq OBW$, $VBW \geq RBW$, Span=0Hz, detector=peak.
5. Repeat above procedures until all frequency measured was complete.

Limit

According to FCC Part 15.231 (a), the transmitter shall be complied the following requirements:

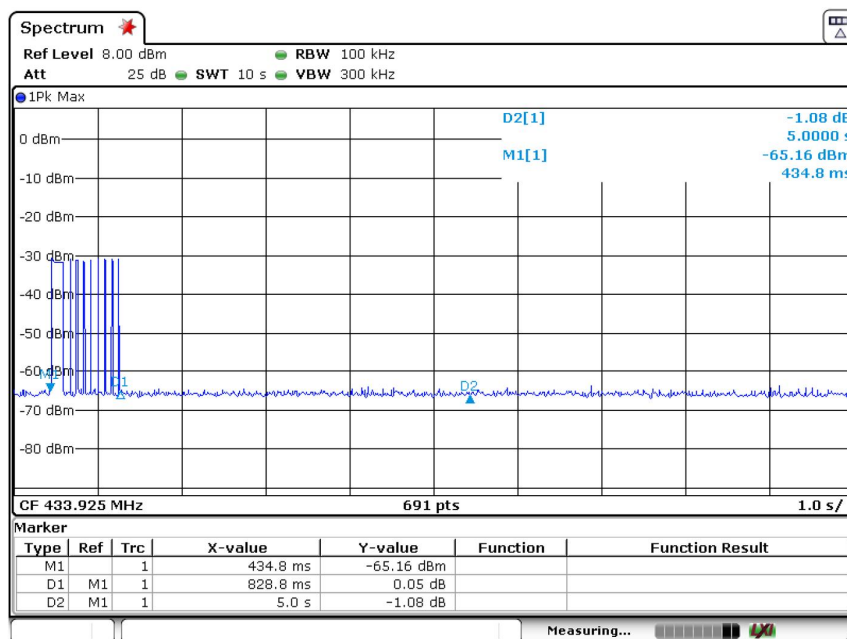
(√) (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

(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.

Test Result

Channel	Frequency	Deactivation Time	Result
1	433.925MHz	828.8ms	Pass



Date: 13.APR.2020 15:15:38

10 Test Equipment List

List of Test Instruments

Radiated Spurious Emission Test

Description	Manufacturer	Model no.	Equipment ID	Serial no.	cal. due date
Signal Analyzer	Rohde & Schwarz	FSV40	68-4-74-14-003	101031	2020-6-28
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	68-4-80-14-003	708	2020-7-5
Horn Antenna	Rohde & Schwarz	HF907	68-4-80-14-004	102295	2020-7-5
Wideband Horn Antenna	Q-PAR	QWH-SL-18-40-K-SG	68-4-80-14-008	12827	2020-7-5
Loop Antenna	Rohde & Schwarz	HFH2-Z2	68-4-80-14-006	100398	2020-7-7
Pre-amplifier	Rohde & Schwarz	SCU 18	68-4-29-14-001	102230	2020-6-28
Pre-amplifier	Rohde & Schwarz	SCU 40A	68-4-29-14-002	100432	2020-7-16
Fully Anechoic Chamber	TDK	8X4X4	68-4-90-14-002	--	2020-7-7
Test software	Rohde & Schwarz	EMC32	68-4-90-14-002-A10	Version 9.15.00	N/A

Conducted Emission Test

Description	Manufacturer	Model no.	Equipment ID	Serial no.	cal. due date
EMI Test Receiver	Rohde & Schwarz	ESR 3	68-4-74-14-001	101782	2020-6-28
LISN	Rohde & Schwarz	ENV4200	8-4-87-14-001	100249	2020-6-28
LISN	Rohde & Schwarz	ENV432	68-4-87-16-001	101318	2020-7-19
LISN	Rohde & Schwarz	ENV216	68-4-87-14-002	100326	2020-6-28
ISN	Rohde & Schwarz	ENY81	68-4-87-14-003	100177	2020-6-28
ISN	Rohde & Schwarz	ENY81-CA6	68-4-87-14-004	101664	2020-6-28
High Voltage Probe	Rohde & Schwarz	TK9420(VT9 420)	68-4-27-14-001	9420-584	2020-6-24
RF Current Probe	Rohde & Schwarz	EZ-17	68-4-27-14-002	100816	2020-7-2
Attenuator	Shanghai Huaxiang	TS2-26-3	68-4-81-16-003	080928189	2020-6-28
Test software	Rohde & Schwarz	EMC32	68-4-90-14-003-A10	Version 9.15.00	N/A

RF Test System

Description	Manufacturer	Model no.	Equipment ID	Serial no.	cal. due date
Signal Analyzer	Rohde & Schwarz	FSV40	68-4-74-14-004	101030	2020-6-28

11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz	Horizontal: 4.81dB; Vertical: 4.89dB;
Uncertainty for Radiated Spurious Emission 25MHz-3000MHz	Horizontal: 4.69dB; Vertical: 4.68dB;
Uncertainty for Radiated Spurious Emission 3000MHz-18000MHz	Horizontal: 4.89dB; Vertical: 4.87dB;
Uncertainty for Radiated Spurious Emission 18000MHz-40000MHz	Horizontal: 4.81dB; Vertical: 4.89dB;
Uncertainty for Conducted Emission 150kHz-30MHz (for test using AMN ENV432 or ENV4200)	3.21dB