

FCC/IC - TEST REPORT

Report Number : **68.910.19.0011.01** Date of Issue: February 27, 2020

Model : **MT02-0101-069005**

Product Type : Transmitter

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 : ☒ **Positive** ☐ **Negative**

Total pages including
Appendices : 18

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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,
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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/PMN:	Transmitter
Model no./HVIN/PMN:	MT02-0101-069005
FCC ID:	2AGGZMT020101069005
IC:	21769-MT020101005
Rating:	3VDC
RF Transmission Frequency:	433.925MHz
Modulation:	FSK
Antenna Type:	PCB Antenna
Antenna Gain:	1dBi
Description of the EUT:	The Equipment Under Test (EUT) is a Transmitter 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	N/A	N/A	Not Applicable
§15.205, §15.209, 15.35 (c)§15.231(b)	RSS-210 A.1.2	Radiated Emission, 30MHz to 4.5GHz	10	Site 1	Pass
§15.231(c)	RSS-210 A.1.3	Bandwidth Measurement	15	Site 1	Pass
§15.231(a)(1)	RSS-210 A.1.1(a)	Deactivation Time	16	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 an PCB Antenna, which gain is 1dBi. 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: 2AGGZMT020101069005, IC: 21769-MT020101005 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.

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 1, 2019

Testing Start Date: March 1, 2019

Testing End Date: March 20, 2019

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

Reviewed by:

Prepared by:

Tested by:



John Zhi
EMC Project Manager



Mark Chen
EMC Project Engineer



Carry Cai
EMC Test Engineer

7 Systems test configuration

Auxiliary Equipment Used during Test:

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

8.1 Radiated test setups

The diagram illustrates the experimental setup for antenna measurement. It features a Turntable supporting the EUT (Equipment Under Test). A Spectrum Analyzer is connected to the setup. The Ground Plane is indicated at the base. The Coaxial Cable is used for signal transmission. Key dimensions are marked: a 3m distance between the turntable and the antenna, a 0.8m height for the turntable, and a 1m to 4m height for the antenna structure.

The diagram illustrates the experimental setup for measuring the radiation pattern of a UWB antenna. It features a Turntable with an EUT (Electromagnetic Under Test) on top, positioned 1.5m above the ground plane. A 3m distance separates the EUT from the Horn antenna. The Horn antenna is mounted on an Antenna tower. A Spectrum analyzer with a Pre-amp is connected to the Horn antenna. A 2.4m distance is marked between the EUT and the Horn antenna.

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graph LR
    MR[Measuring receiver] --- EUT[EUT]

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9 Test Methodology

9.1 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.

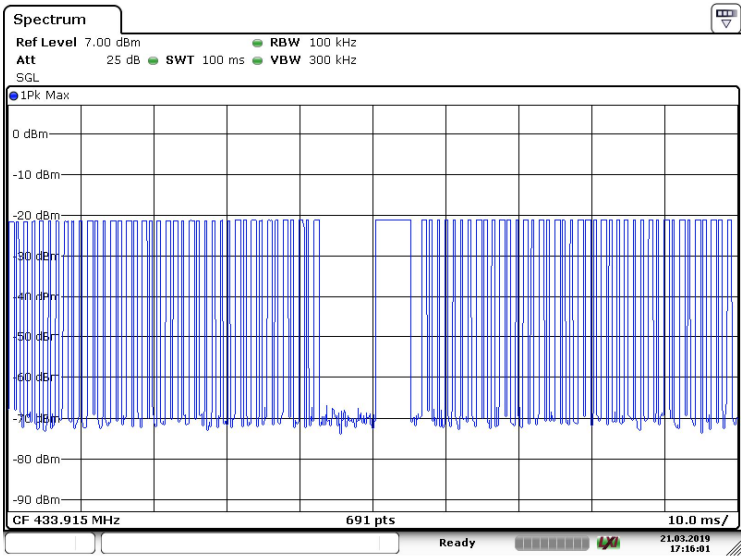
Radiated Emissions								
Value	Emissions Frequency MHz	E-Field Polarity	Field at 3m dBμV/m	Average Factor dB	Net Field at 3m dBμV/m	Limit dBμV/m	Margin	Emission Type
Below 1GHz								
PK	433.925	H	84.88	0.00	68.89	100.83	31.94	Fundamental
AV	433.925	H	84.88	-7.20	77.68	80.83	3.15	Fundamental
PK	433.925	V	67.98	0.00	67.98	100.83	32.85	Fundamental
AV	433.925	V	67.98	-7.20	60.78	80.83	20.05	Fundamental
PK	867.850	H	63.72	0.00	63.72	80.83	17.11	Spurious
AV	867.850	H	63.72	-7.20	56.52	60.83	4.31	Spurious
PK	867.850	V	34.04	0.00	34.04	80.83	46.79	Spurious
AV	867.850	V	34.04	-7.20	26.84	60.83	33.99	Spurious
Above 1GHz								
PK	3037.48	H	52.99	0.00	52.99	74	21.01	Spurious
AV	3037.48	H	52.99	-7.2	45.79	54	8.21	Spurious
PK	3037.48	V	45.42	0.00	45.42	74	28.58	Spurious
AV	3037.48	V	45.42	-7.2	38.22	54	15.78	Spurious

Remark:

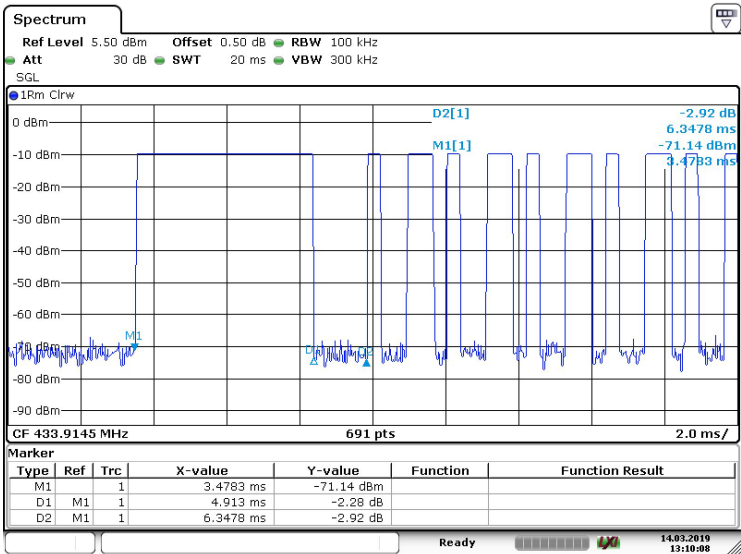
- 1: AV Emission Level= PK Emission Level+20log(dutycycle)
- 2: Data of measurement within this frequency range shown "/" in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.
- 3: "" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.
- 4: Corrected Amplitude = Read level + Corrector factor
Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
Below 1GHz: Corrector factor = Antenna Factor + Cable Loss

Duty Cycle = $[4.913\text{ms} + (0.7971 \times 27) + (0.3913 \times 44)] / 100$ (ms) = 43.65%

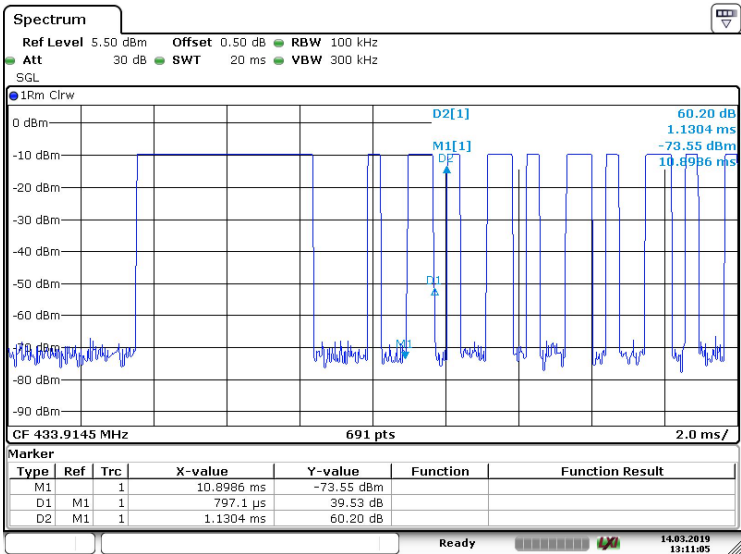
Duty Cycle Factor = $20\log$ (Duty Cycle) = -7.2



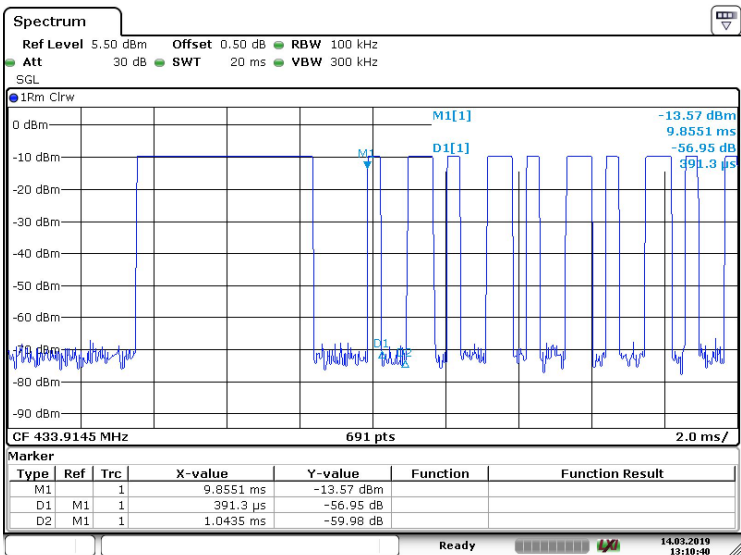
Date: 21.MAR.2019 17:16:01



Date: 14.MAR.2019 13:10:08



Date: 14.MAR.2019 13:11:05



Date: 14.MAR.2019 13:10:40

9.2 Bandwidth Measurement

Test Method

1. 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.

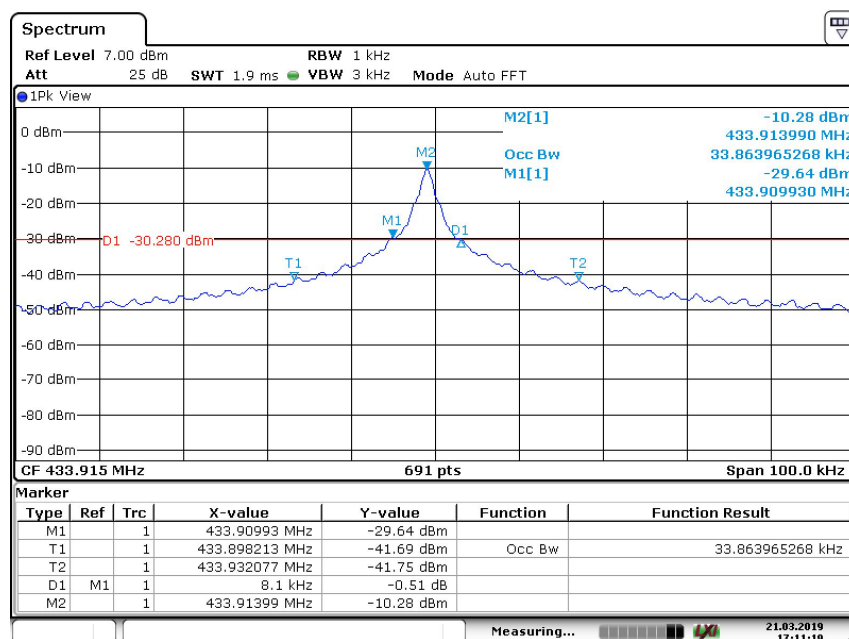
Limit

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% * 433.91 MHz = 1084 kHz

Test Result

Channel	20dB Bandwidth (KHz)	99% bandwidth (KHz)	Limit (KHz)
1	8.1	33.86KHz	1084



Date: 21.MAR.2019 17:11:19

9.3 Deactivation Time

Test Method

1. 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=120 KHz, VBW=1MHz, Span=0Hz.
5. Repeat above procedures until all frequency measured was complete.

Limit

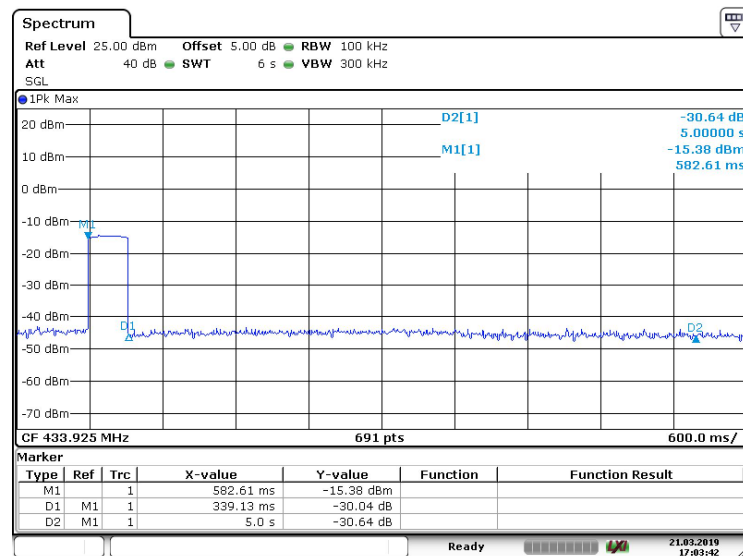
According to FCC Part 15.231 (a), the transmitter shall be complied the following requirements:
(√) (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

(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	339.13ms	Pass



Date: 21.MAR.2019 17:03:42

10 Test Equipment List

List of Test Instruments

RF conducted Test

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

Radiated Emission Test

Description	Manufacturer	Model no.	Equipment ID	Serial no.	cal. due date
EMI Test Receiver	Rohde & Schwarz	ESR 26	68-4-74-14-002	101269	2020-6-28
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	68-4-80-14-002	707	2020-8-20
Horn Antenna	Rohde & Schwarz	HF907	68-4-80-14-005	102294	2020-6-22
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
Signal Generator	Rohde & Schwarz	SMY01	68-4-48-16-001	839369/005	2020-6-28
Attenuator	Agilent	8491A	68-4-81-16-001	MY39264334	2020-6-28
3m Semi-anechoic chamber	TDK	9X6X6	68-4-90-14-001	----	2020-7-7
Test software	Rohde & Schwarz	EMC32	68-4-90-14-001-A10	Version9.15.00	N/A

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 Spurious Emission 25MHz-3000MHz	Horizontal: 4.81dB; Vertical: 4.89dB;
Uncertainty for Radiated Spurious Emission 3000MHz-18000MHz	Horizontal: 4.69dB; Vertical: 4.68dB;
Uncertainty for Radiated Spurious Emission 18000MHz-40000MHz	Horizontal: 4.89dB; Vertical: 4.87dB;
RF Conducted test	RF Power Conducted: 1.16dB Frequency test involved: 0.6×10 ⁻⁷ or 1%