FCC/ISED TEST REPORT

Report Number	:	**709502211902-00A Rev1**	Date of Issue:	May 20, 2022
Model	:	MT01-3101-060002, MT01-3101-060003		
Product Type	:	TDBU RF Controller		
Applicant	:	Rollease Acmeda Inc		
Address	:	7th Floor / 750 East Main Street,Stamford, CT 06902, USA		
Production Facility	:	Ningbo Dooya Mechanic & Electronic Technology Co.,Ltd.		
Address	:	No.168 Shengguang Road,Luotuo,Zhenhai,315202 Ningbo,Zhejiang Province, P.R. China.		
Test Result	:	■ **Positive** ☐ **Negative**		
Total pages including Appendices	:	20		

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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. Shanghai Branch No.16 Lane, 1951 Du Hui Road, Shanghai 201108, P.R. China
Test Firm FCC Registration Number:	820234
Designation number:	CN1183
IC Company Number:	25988
CAB identifier:	CN0101
Telephone:	+86 21 6141 0123
Fax:	+86 21 6140 8600

3 Description of the Equipment Under Test

Product:	TDBU RF Controller
Model no./HVIN/PMN:	MT01-3101-060002, MT01-3101-060003
FCC ID:	2AGGZ003B9ACA3E
IC:	21769-003B9ACA3E
Rating:	USB DC 5V
RF Transmission Frequency:	433.92MHz
Modulation:	FSK
Antenna Type:	ceramic chip antenna
Antenna Gain:	-4.84 dBi
Description of the EUT:	The Equipment Under Test (EUT) is a TDBU RF Controller, transmitter operated at 433. 92MHz.There are two models in all, only different is the model name. We chose mode MT01-3101-060002 to perform test.
Test sample no.:	SHA-631950-1

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators
RSS-Gen Issue 5 April 2018	General Requirements and Information for the Certification of Radio Apparatus
RSS-210 Issue 10 December 2019	RSS-210 — Licence-exempt Radio Apparatus: 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	10-12	Shield room	Pass
§15.205, §15.209, 15.35 (c)§15.231(b)	RSS-210 A.1.2	Radiated Emission, 30MHz to 4.5GHz	13-15	3m chamber	Pass
§15.231(c)	RSS-210 A.1.3	Bandwidth Measurement	16-17	Shield room	Pass
§15.231(a)(1)	RSS-210 A.1.1(a)	Deactivation Time	18	Shield room	Pass
§15.203	RSS-Gen 6.	Antenna requirement	--	See Note 2	Pass

Note 1: N/A=Not Applicable. Conducted emission is not apply for battery operated device.
Note 2: The EUT uses a ceramic chip antenna, which gain is -4.84dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.

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6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2AGGZ003B9ACA3E, IC: 21769-003B9ACA3E complies with Section 15.207, 15.205, 15.209, 15.231 of the FCC Part 15, Subpart C Rules. RSS-Gen Issue 5 and RSS-210 issue 10.

Notice: This revised report replaced all the version issued before.
This report is only revised the test site address on page 7 (changed from "Shenzhen" to "Shanghai"). The results as before are accepted. So, no additional tests are performed.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

☐ - **Not** Performed

The Equipment Under Test

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

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

Sample Received Date:	February 10, 2022
Testing Start Date:	February 10, 2022
Testing End Date:	February 24, 2022

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Reviewed by:	Prepared by:	Tested by:
Hui TONG	Jiaxi XU	Wenqiang LU
EMC Section Manager	EMC Project Engineer	EMC Test Engineer

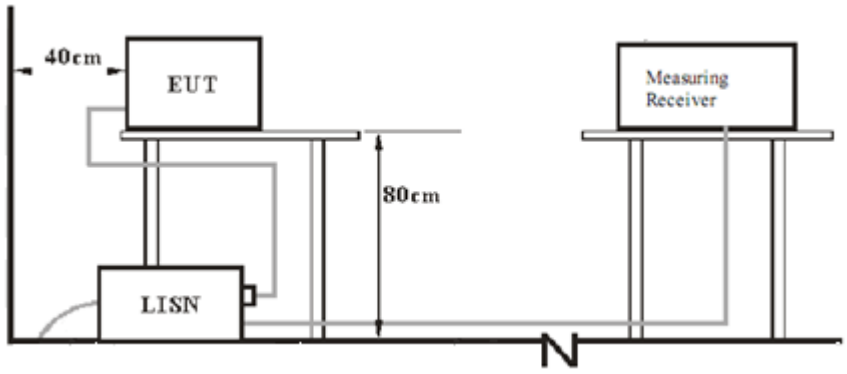
7 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
Adapter	MLF	MLF-A260502000UU	--

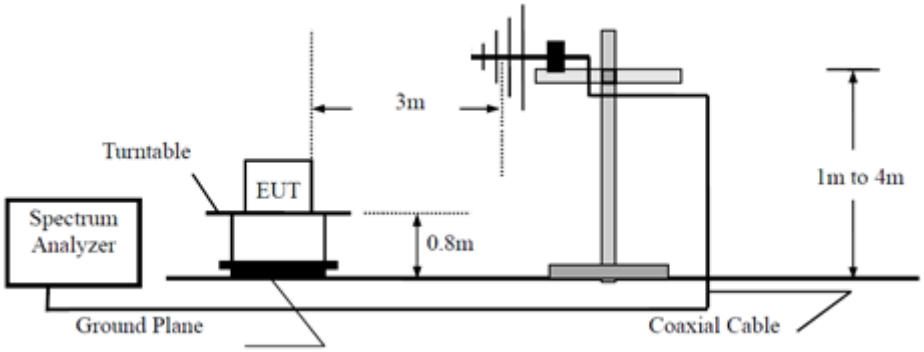
8 Test Setups

8.1 AC Power Line Conducted Emission test setups

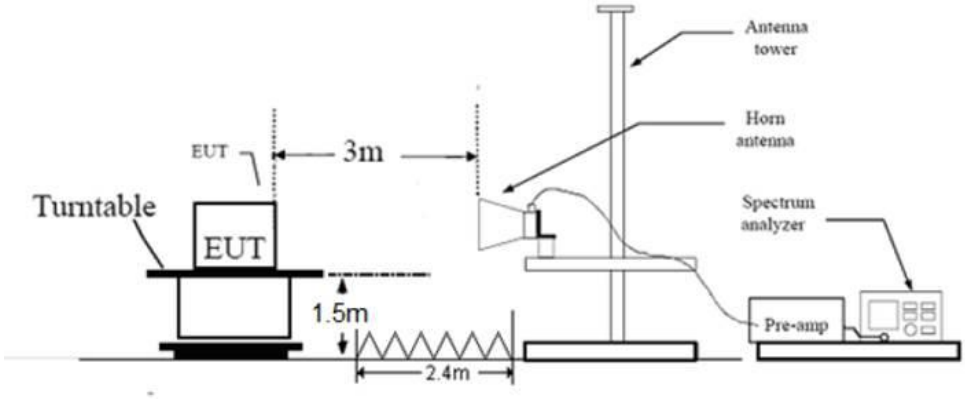


8.2 Radiated test setups

Below 1GHz



Above 1GHz



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9 Test Methodology

9.1 Conducted Emission

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

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

Decreasing linearly with logarithm of the frequency

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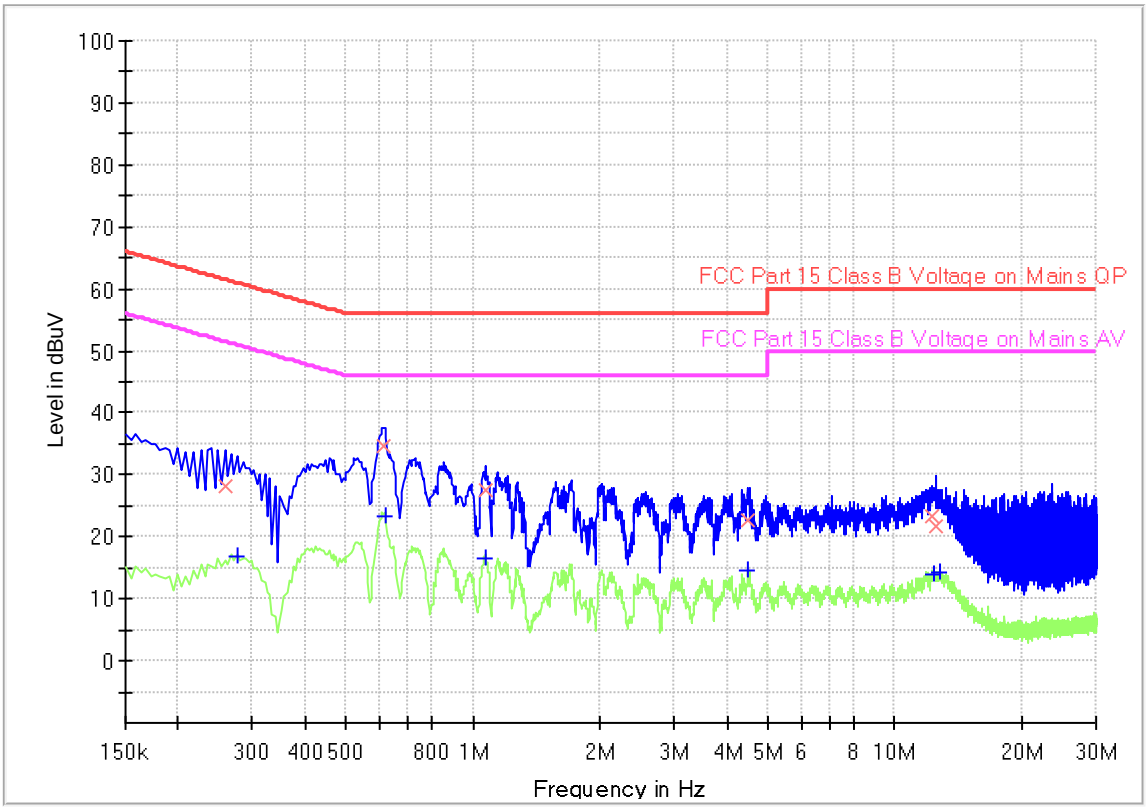
Conducted Emission

Product Type	:	TDBU RF Controller
M/N	:	MT01-3101-060002
Operating Condition	:	Mode 1: Tx_433.92MHz
Test Specification	:	L-line
Comment	:	AC 120V/60Hz



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.258000	28.14	---	61.50	33.36	1000.0	9.000	L1	19.5
0.276000	---	16.73	50.94	34.21	1000.0	9.000	L1	19.5
0.613500	34.61	---	56.00	21.39	1000.0	9.000	L1	19.5
0.618000	---	23.44	46.00	22.56	1000.0	9.000	L1	19.5
1.072500	---	16.50	46.00	29.50	1000.0	9.000	L1	19.5
1.072500	27.58	---	56.00	28.42	1000.0	9.000	L1	19.5
4.488000	22.81	---	56.00	33.19	1000.0	9.000	L1	19.6
4.506000	---	14.57	46.00	31.43	1000.0	9.000	L1	19.6
12.295500	23.20	---	60.00	36.80	1000.0	9.000	L1	19.7
12.336000	---	14.08	50.00	35.92	1000.0	9.000	L1	19.7
12.525000	21.71	---	60.00	38.29	1000.0	9.000	L1	19.7
12.813000	---	14.11	50.00	35.89	1000.0	9.000	L1	19.7

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + LISN Factor (dB) + 10dB Attenuator

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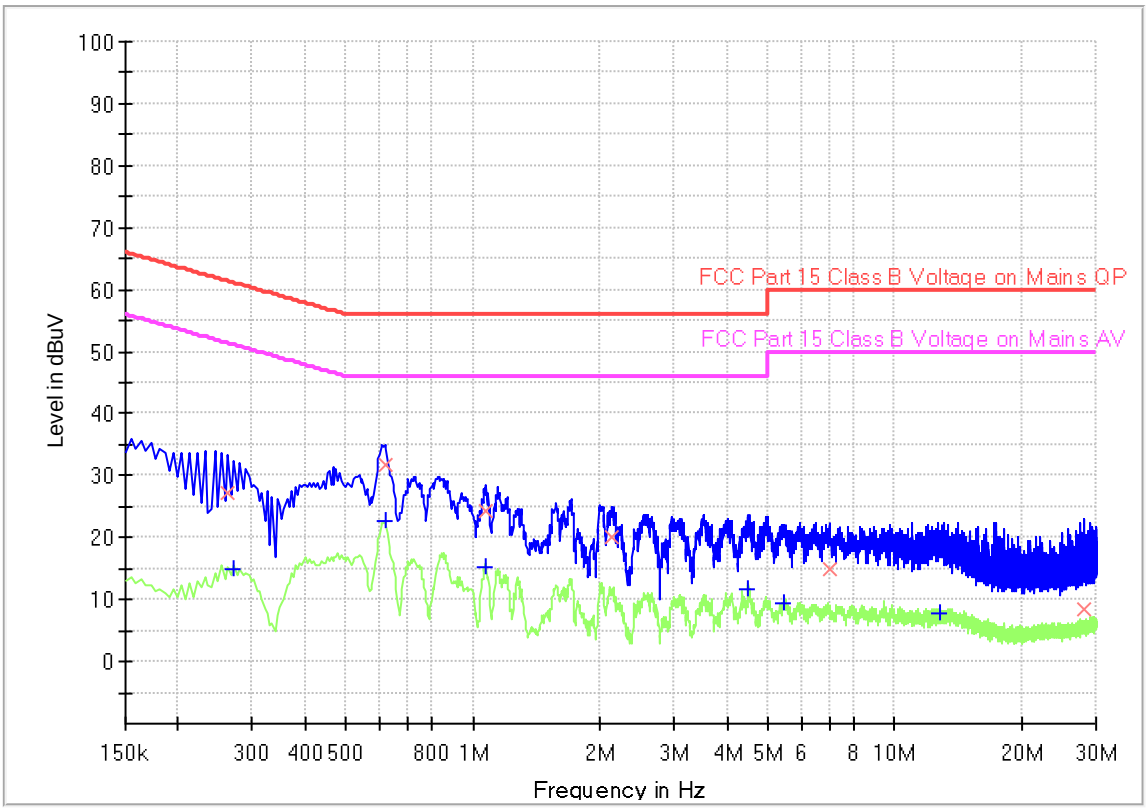
Product Type	:	TDBU RF Controller
M/N	:	MT01-3101-060002
Operating Condition	:	Mode 1: Tx_433.92MHz
Test Specification	:	N-line
Comment	:	AC 120V/60Hz



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.262500	27.27	---	61.35	34.08	1000.0	9.000	N	19.5
0.271500	---	14.81	51.07	36.26	1000.0	9.000	N	19.5
0.618000	---	22.61	46.00	23.39	1000.0	9.000	N	19.5
0.618000	31.88	---	56.00	24.12	1000.0	9.000	N	19.5
1.068000	---	15.12	46.00	30.88	1000.0	9.000	N	19.5
1.077000	24.25	---	56.00	31.75	1000.0	9.000	N	19.5
2.139000	20.15	---	56.00	35.85	1000.0	9.000	N	19.5
4.506000	---	11.82	46.00	34.18	1000.0	9.000	N	19.5
5.482500	---	9.31	50.00	40.69	1000.0	9.000	N	19.6
6.981000	14.99	---	60.00	45.01	1000.0	9.000	N	19.6
12.736500	---	7.84	50.00	42.16	1000.0	9.000	N	19.7
28.068000	8.42	---	60.00	51.58	1000.0	9.000	N	20.1

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + LISN Factor (dB) + 10dB Attenuator

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9.2 Radiated Emission

Test Method

1. 1 The EUT was place on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meters chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
4. 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.
5. 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.
6. Use the following spectrum analyzer settings According to C63.10:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz; VBW RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥1 GHz for peak measurement.
   For average measurement:
   VBW = 10 Hz, when duty cycle is no less than 98 percent.
   VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum
   power control level for the tested mode of operation.
7. Repeat above procedures until all frequencies measured were complete.

Limit

According to §15.231 (b), the 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 3750 *
174-260	3,750	375
260-470 √	3,750 to 12, 500*	375 to 1,250*
Above 470	12,500	1,250

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Limits for 15.209 Radiated emission limits; general requirements

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Frequency	Limit at 3m (dBuV/m)
0.009 MHz – 0.490 MHz	128.5 to 93.8[1]
0.490 MHz – 1.705 MHz	73.8 to 63[1]
1.705 MHz – 30 MHz	69.5[1]
30 MHz – 88 MHz	40.0[1]
88 MHz – 216 MHz	43.5[1]
216 MHz – 960 MHz	46.0[1]
Above 960 MHz	54.0[1]
Above 1000 MHz	54.0[2]
Above 1000 MHz	74.0[3]

[1]Limit is with detector with bandwidths as defined in CISPR-16-1-1 except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz where an Average detector is used.
[2]Limit is with 1 MHz measurement bandwidth and using an Average detector
[3]Limit is with 1 MHz measurement bandwidth and using a Peak detector

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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	E-Field	Field	Average	Net Field	Limit		Emission Type
	Frequency	Polarity	Strength at 3m	Factor	Strength at 3m		Margin	
	MHz		**dBµV/m**	**dB**	**dBµV/m**	**dBµV/m**	**dB**	
PK	433.91	H	69.58	/	69.58	80.80	11.22	Fundamental
PK	325.41	H	30.12	/	30.12	46.00	15.88	restricted band
PK	867.83	H	38.21	/	38.21	60.80	22.59	Spurious
PK	1736.83	H	40.35	/	40.35	60.80	20.45	Spurious
PK	3037.32	H	44.62	/	44.62	60.80	16.18	Spurious
PK	3471.12	H	45.79	/	45.79	60.80	15.01	Spurious
PK	433.91	V	70.42	/	70.42	80.80	10.38	Fundamental
PK	867.88	V	36.88	/	36.88	74.00	37.12	restricted band
PK	1720.85	V	40.28	/	40.28	60.80	20.52	Spurious
PK	1736.83	V	41.02	/	41.02	60.80	19.78	Spurious
PK	3471.12	V	44.11	/	44.11	60.80	16.69	Spurious

Remark:
1. Corrected Amplitude = Read level + Corrector factor
   Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
   Below 1GHz: Corrector factor = Antenna Factor + Cable Loss
2. Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz)
3. Corrected Reading = Original Receiver Reading + Correct Factor
4. Only the worst data listed in this report, Other frequency was 20dB below the limit
5. Because of the PK value was less than the AV limit, the duty cycle was not measured.

9.3 Bandwidth Measurement

Test Method

1. Set to the maximum power setting and enable the EUT transmit continuously.
2. Use the following test receiver settings:
   Span = approximately 5 times the 20dB bandwidth, centered on a hopping channel
   RBW =1% to 5% of the 20dB bandwidth of the emission being measured, VBW≥RBW,
   Sweep = auto, Detector function = peak, Trace = max hold
3. 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.
4. 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)	Limit (KHz)
1	81.10	1084

Channel	99% bandwidth (KHz)	Limit (KHz)
1	79.81	N/A

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20dB Bandwidth

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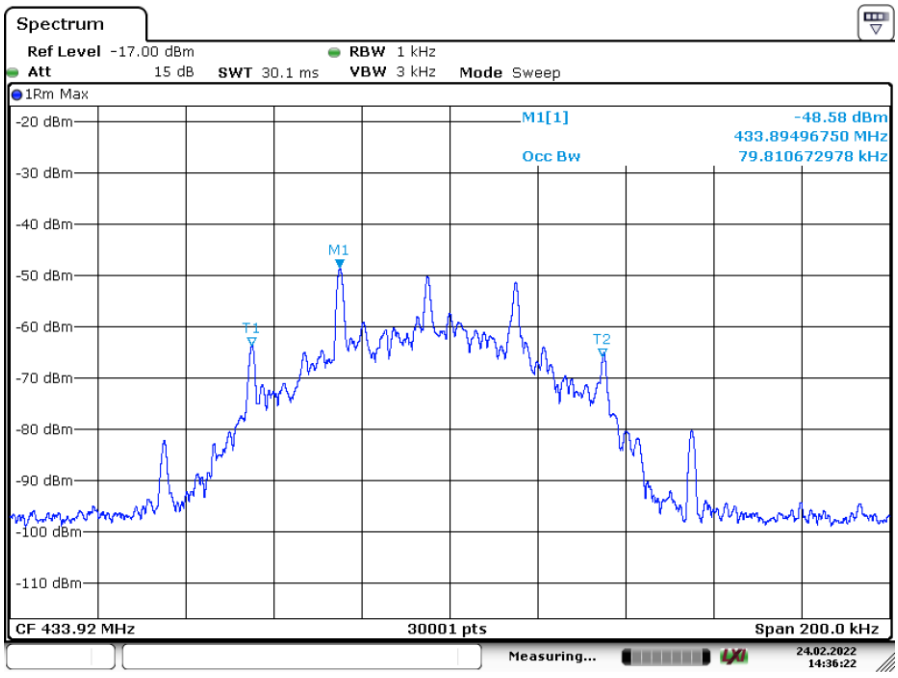
99% bandwidth



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9.4 Deactivation Time

Test Method

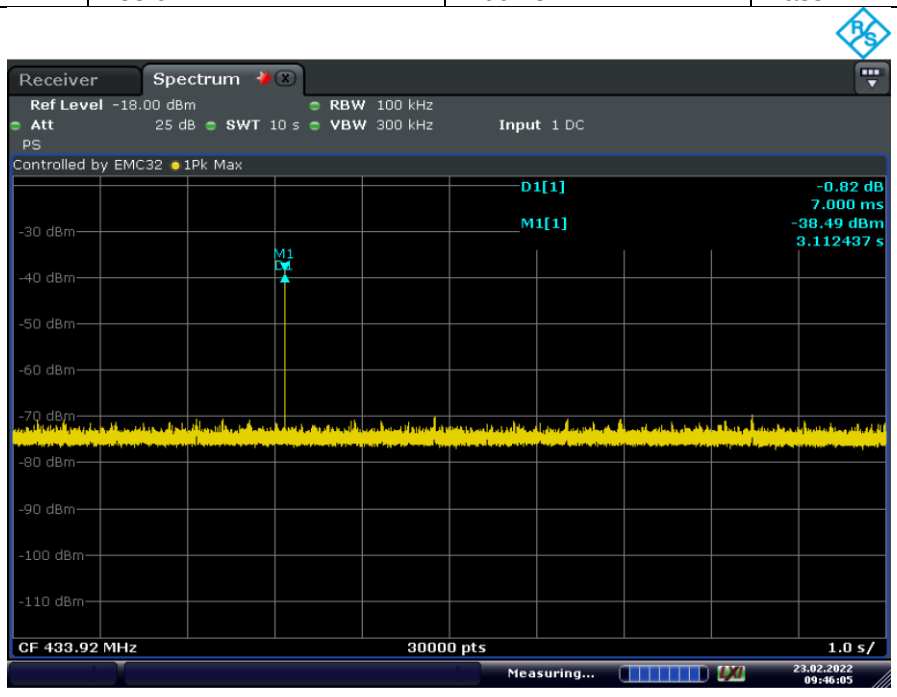
1. Set to the maximum power setting and enable the EUT in transmitting mode.
2. Set center frequency of spectrum analyzer=operating frequency.
3. Set the spectrum analyzer as RBW=120 KHz, VBW=1MHz, Span=0Hz.
4. Repeat above procedures until all frequency measured was complete.

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	433.92MHz	7.00ms	Pass



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10 Test Equipment List

List of Test Instruments

RF Test

Description	Manufacturer	Model no.	Serial no.	Calibration Date	Calibration Due
Signal and spectrum analyzer	R&S	FSV40	S1503003-YQ-EMC	2021-8-02	2022-8-01

Conducted Emission

Description	Model no.	Manufacturer	Equipment ID.	Calibration Date	Calibration Due
EMI test receiver	ESR3	R&S	S1503001-YQ-EMC	2021-8-02	2022-8-01
2-Line V-network	ENV216	R & S	S1503103-YQ-EMC	2021-8-02	2022-8-01

Radiated Emission Test

USED	Equipment Name	Model	Manufacturer	Equipment ID.	Calibration Date	Calibration Due
☒	EMI test receiver	ESR3	R&S	S1503109-YQ-EMC	2021-8-02	2022-8-01
☒	Trilog super broadband test antenna	SCHWARZBECK	VULB9168	S1808296-YQ-EMC	2021-9-23	2024-9-22
☒	Double-ridged waveguide horn antenna	HF907	R&S	S1503009-YQ-EMC	2021-4-13	2024-4-12
☒	Signal conditioning unit	SCU-18D	R&S	S1503012-YQ-EMC	2021-8-02	2022-8-01
☒	Signal and spectrum analyzer	FSV40	R&S	S1503003-YQ-EMC	2021-8-02	2022-8-01
☒	Loop antenna	HFH2-Z2	R&S	S1503013-YQ-EMC	2021-5-21	2022-5-20

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:

Items	Extended Uncertainty
Radiated Disturbance	30MHz to 1GHz, ±5.03dB (Horizontal) ±5.11dB (Vertical) 1GHz to 18GHz, ±5.15dB (Horizontal) ±5.12dB (Vertical) 18GHz to 25GHz, ±4.76dB

Measurement Uncertainty Decision Rule:

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2007, clause 4.4.3 and 4.5.1.

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