



FCC - TEST REPORT

Report Number	: 709502501345-00B	Date of Issue: <u>June 06 , 2025</u>
Model	: DM35LE/S-6/24	
Product Type	: DC Tubular motor	
Applicant	: Keystone sales group, Inc	
Address	: 801 West 116th Ave Suite 300, Westminster, Colorado 80234, United States	
Production Facility	: Ningbo Dooya Mechanic & Electronic Technology Co., Ltd.	
Address	: No.168 Shengguang Road, Luotuo, Zhenhai 315202 Ningbo,	
	: Zhejiang province People's Republic of China	
Test Result	: <input checked="" type="checkbox"/> Positive <input type="checkbox"/> Negative	
Total pages including Appendices	: <u>23</u>	

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2 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
709502501345-00B	First Issue	June 06, 2025

3 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
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Shanghai 201108,
P.R. China

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FCC Registration No.: 820234

FCC Designation Number: CN1183

ISED CAB identifier CN0101

IC Registration No.: 31668



4 Description of the Equipment Under Test

Product: DC tubular motor

Model no.: DM35LE/S-6/24

FCC ID: 2AJXRDM35LES624V1

IC: NA

Options and accessories: NA

Rating: 12V DC

RF Transmission Frequency: 433.92MHz;

No. of Operated Channel: 1;

Modulation: 2GFSK;

Channel list: 433.92MHz;

Antenna Type: Line Antenna;

Description of the EUT: The Equipment Under Test (EUT) is a DC tubular motor with SRD function. We tested it and listed the worst data in this report.

Test sample no.: SHA-893203-2

The sample's mentioned in this report is/are submitted/ supplied/ manufactured by client. The laboratory therefore assumes no responsibility for accuracy of information on the brand name, model number, origin of manufacture, consignment, antenna gain or any information supplied.



5 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2023 Edition	RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to ANSI C63.10-2020.



6 Summary of Test Results

Technical Requirements				
FCC Part 15 Subpart C				
Test Condition		Pages	Test Site	Test Result
§15.207	Conducted emission AC power port	11-13	Shield room	Pass
§15.205, §15.209, 15.35 (c)§15.231(b)	The Field strength of Emissions	14-17	3m chamber	Pass
§15.231(c)	20dB Bandwidth Measurement	18	Shield room	Pass
§15.231(a)(1)	Deactivation Time	19	Shield room	Pass
§15.203	Antenna requirement	See Note 1		Pass

Remark

Note 1: The EUT uses a Line Antenna. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.



7 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2AJXRDM35LES624V1 complies with Section 15.207, 15.205, 15.209, 15.231 of the FCC Part 15, Subpart C Rules.

The EUT is a DC tubular motor supports SRD functions (433.92MHz transmitter). Tests were performed when EUT was power supplied with 12VDC and 120V~ 60Hz (by AC/DC charger) respectively. The worst data was recorded.

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 25, 2025

Testing Start Date: February 27, 2025

Testing End Date: March 11, 2025

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

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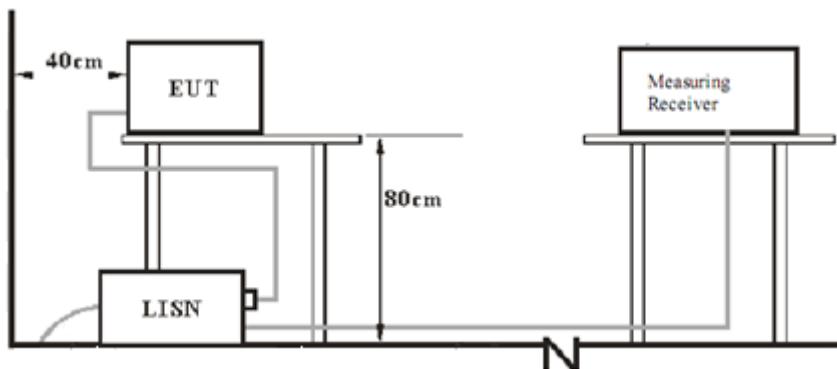
8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
AC/DC charger	JIN XIN YU POWER (SHENZHEN) SUPPLY CO., LTD	XVE-1260100	--

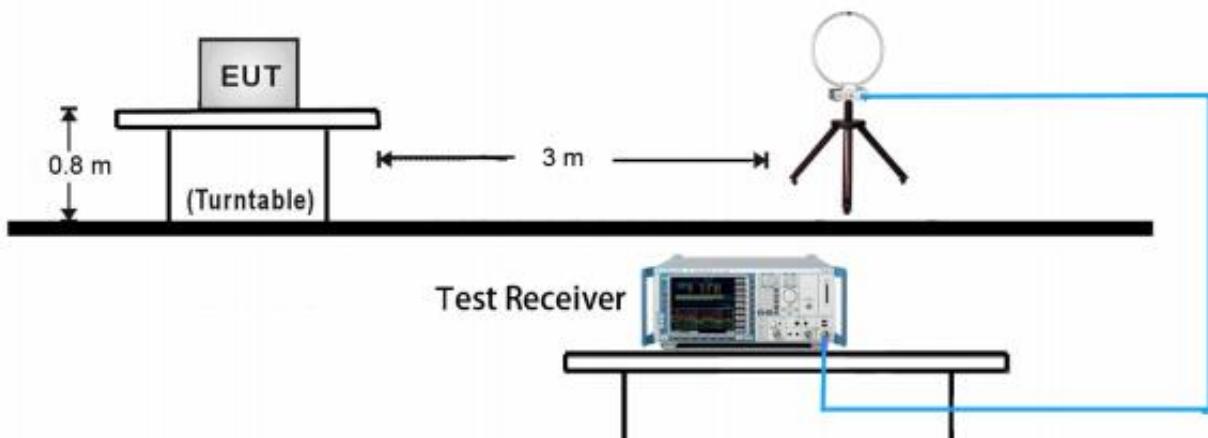
9 Test Setups

8.1 AC Power Line Conducted Emission test setups

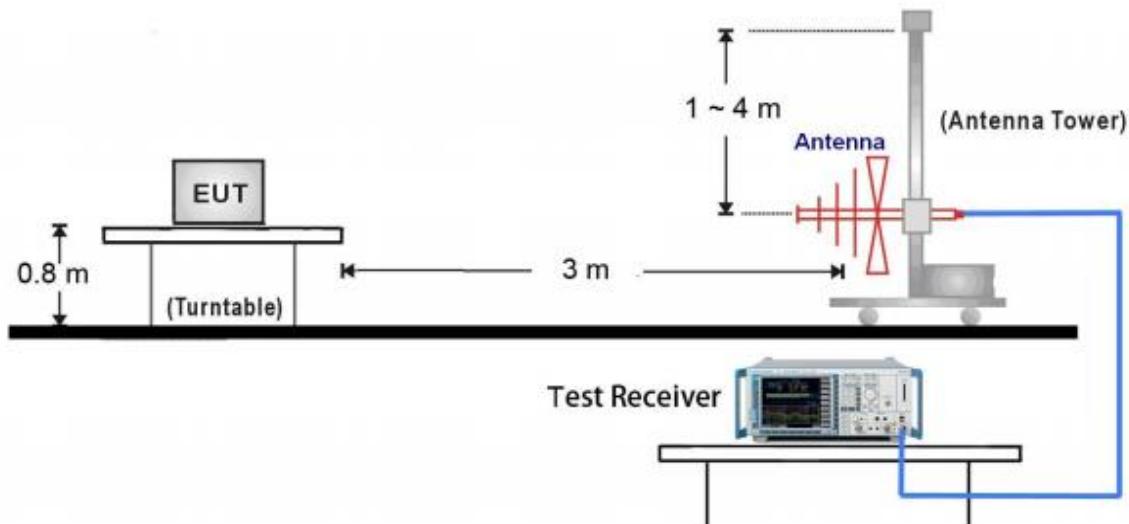


8.2 Radiated test setups

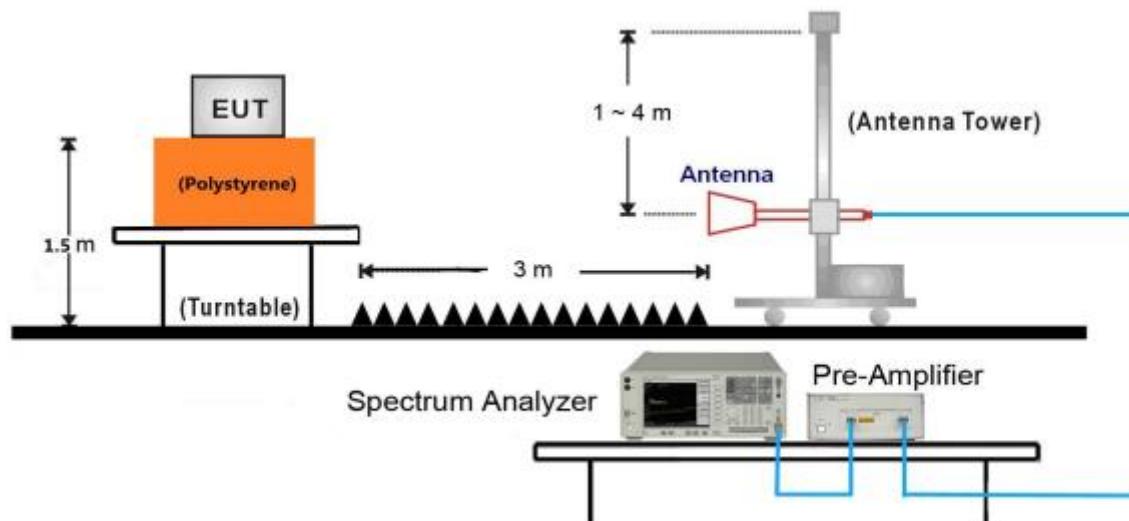
9kHz ~ 30MHz Test Setup:



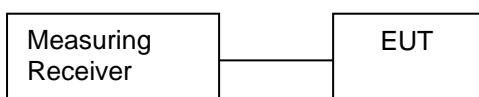
30MHz ~ 1GHz Test Setup:



Above 1GHz Test Setup:



8.3 Conducted RF test setups





10 Test Methodology

10.1 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.
5. Both sides of AC line were checked for maximum conducted interference.
6. The frequency range from 150 kHz to 30 MHz was searched.
7. 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

According to §15.207, conducted emissions limit as below:

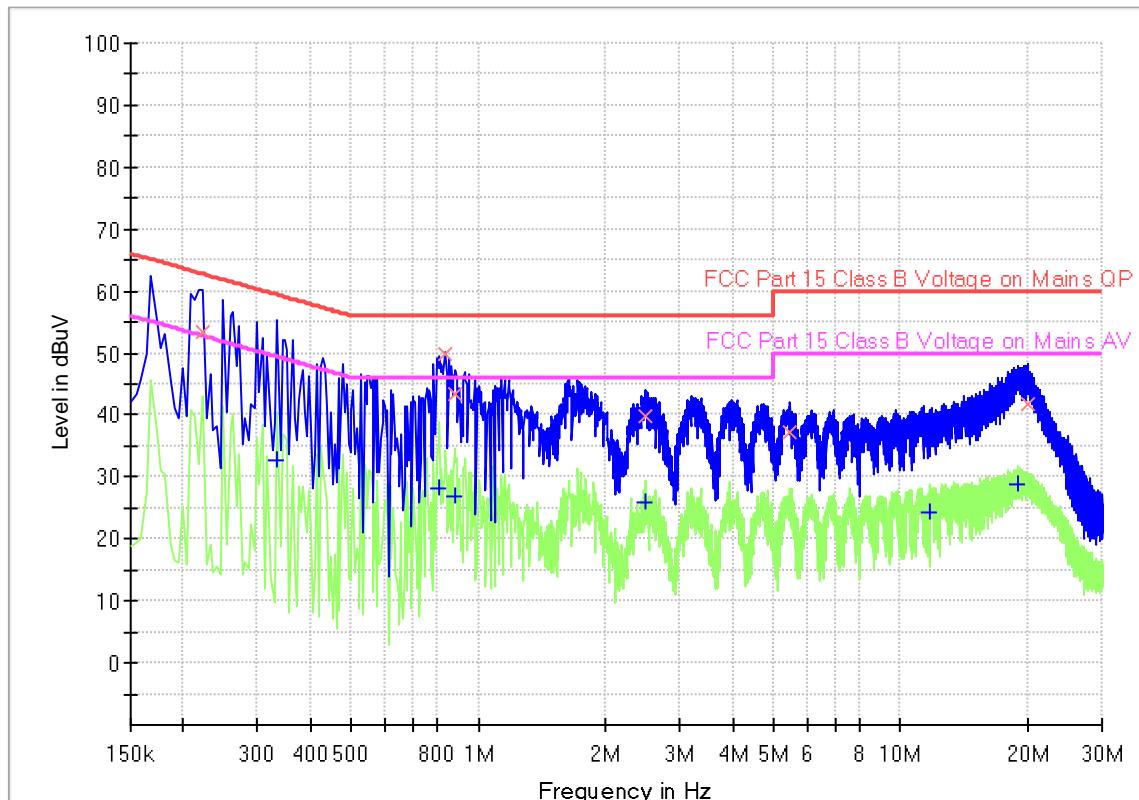
Frequency MHz	QP Limit dB μ V	AV Limit dB μ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

*Decreasing linearly with logarithm of the frequency.



Conducted Emission Test 0.15MHz – 30MHz

Product Type : DC tubular motor
 M/N : DM35LE/S-6/24
 Operating Condition : Mode: Tx 433.92MHz
 Test Specification : L-line
 Comment : AC 120V/60Hz (by AC/DC charger)



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.222000	53.35	---	62.74	9.39	1000.0	9.000	L1	19.5
0.334500	---	32.80	49.34	16.54	1000.0	9.000	L1	19.5
0.807000	---	28.28	46.00	17.72	1000.0	9.000	L1	19.5
0.834000	49.84	---	56.00	6.16	1000.0	9.000	L1	19.5
0.879000	---	26.83	46.00	19.17	1000.0	9.000	L1	19.5
0.883500	43.54	---	56.00	12.46	1000.0	9.000	L1	19.5
2.485500	39.80	---	56.00	16.20	1000.0	9.000	L1	19.5
2.499000	---	25.78	46.00	20.22	1000.0	9.000	L1	19.5
5.487000	37.26	---	60.00	22.74	1000.0	9.000	L1	19.6
11.751000	---	24.30	50.00	25.70	1000.0	9.000	L1	19.8
19.041000	---	28.79	50.00	21.21	1000.0	9.000	L1	20.3
20.071500	41.71	---	60.00	18.29	1000.0	9.000	L1	20.4

Remark:

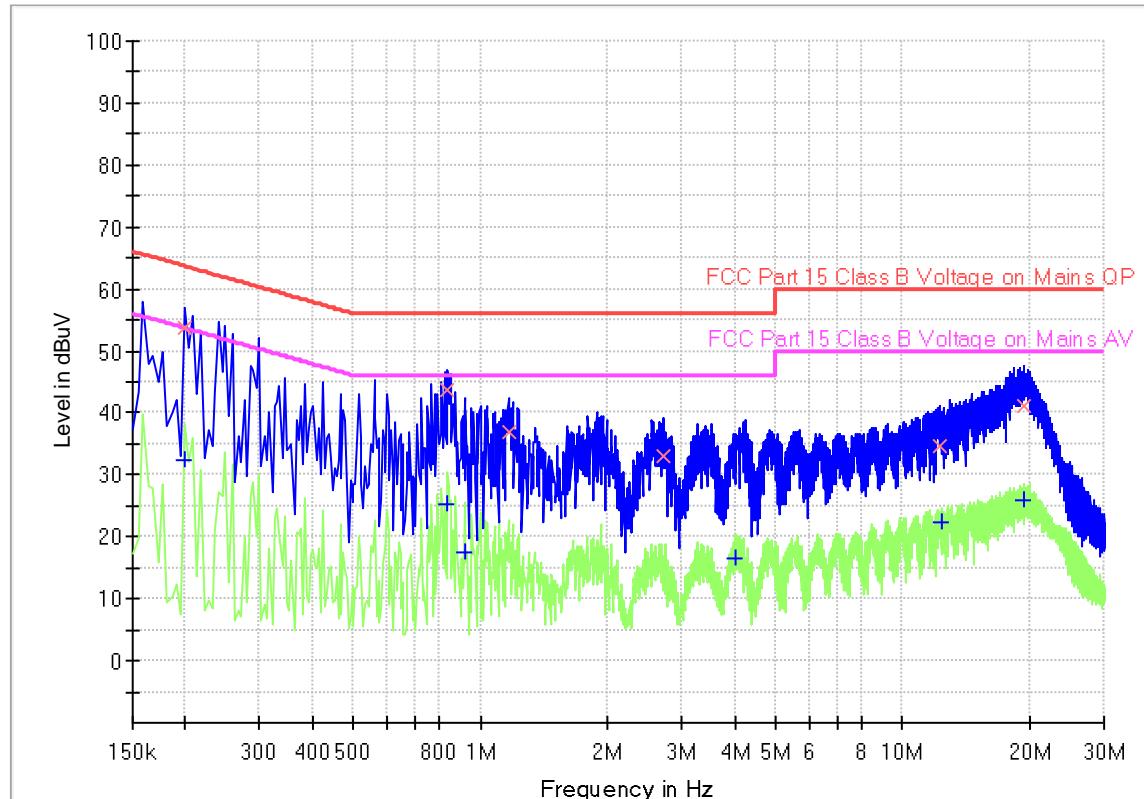
Measure Level (dBuV/m) = Reading Level (dBuV) + Correction Factor (dB)

Correction Factor (dB) = Cable Loss (dB) + LISN Factor (dB) + 10dB Attenuator

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



Product Type : DC tubular motor
 M/N : DM35LE/S-6/24
 Operating Condition : Mode: Tx 433.92MHz
 Test Specification : N-line
 Comment : AC 120V/60Hz (by AC/DC charger)



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.199500	---	32.52	53.63	21.11	1000.0	9.000	N	19.4
0.199500	53.62	---	63.63	10.01	1000.0	9.000	N	19.4
0.834000	---	25.25	46.00	20.75	1000.0	9.000	N	19.5
0.834000	43.66	---	56.00	12.34	1000.0	9.000	N	19.5
0.915000	---	17.60	46.00	28.40	1000.0	9.000	N	19.5
1.167000	36.80	---	56.00	19.20	1000.0	9.000	N	19.5
2.710500	33.13	---	56.00	22.87	1000.0	9.000	N	19.5
4.015500	---	16.66	46.00	29.34	1000.0	9.000	N	19.6
12.291000	34.69	---	60.00	25.31	1000.0	9.000	N	19.8
12.385500	---	22.45	50.00	27.55	1000.0	9.000	N	19.8
19.423500	---	25.91	50.00	24.09	1000.0	9.000	N	20.2
19.423500	41.27	---	60.00	18.73	1000.0	9.000	N	20.2

Remark:

Measure Level (dBuV/m) = Reading Level (dBuV) + Correction Factor (dB)

Correction Factor (dB) = Cable Loss (dB) + LISN Factor (dB) + 10dB Attenuator

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



10.2 Radiated Emission

Test Method

- 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 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:
 - 9kHz -150kHz
RBW = 200Hz, VBW = 1kHz for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.
 - 150kHz - 30MHz
RBW = 10 kHz, VBW = 30 kHz for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.
 - 30MHz - 1GHz
RBW = 100 kHz, VBW = 300 kHz for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.
 - For Above 1GHz
RBW = 1MHz, VBW \geq 3RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.



Limit

1. FCC Limit: In addition to the provisions of § 15.205, 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 3,750 *	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

*Linear interpolation with frequency

(a) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.

(b) Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in § 15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of § 15.205 shall be demonstrated using the measurement instrumentation specified in that section.

(c) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in § 15.209, whichever limit permits a higher field strength.

Limits for 15.209 Radiated emission limits

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



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.

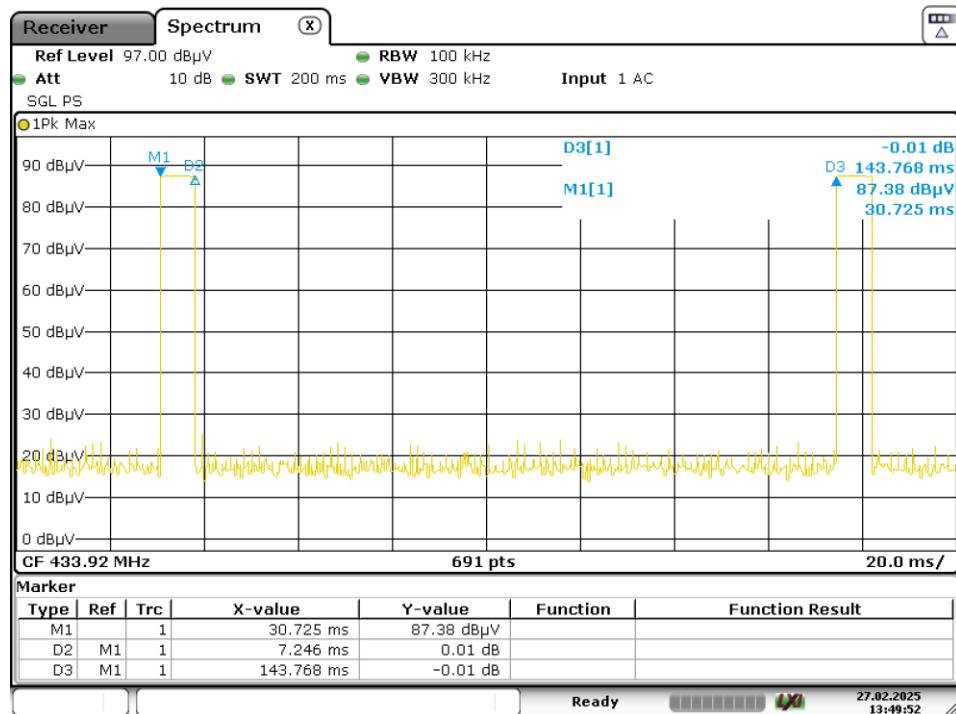
Radiated Emission								
Value	Emissions Frequency MHz	E-Field Polarity	PK Emission dB μ V/m	Average Factor dB	AV Emission dB μ V/m	Limit dB μ V/m	Margin	Emission Type
Below 1GHz								
PK	433.92	H	84.95	/	/	100.83	15.88	Fundamental
AV	433.92	H	84.95	-22.80	62.15	80.83	18.68	Fundamental
PK	433.92	V	83.16	/	/	100.83	17.67	Fundamental
AV	433.92	V	83.16	-22.80	60.36	80.83	20.47	Fundamental
PK	867.644	H	38.69	/	/	80.83	42.14	Spurious
AV	867.644	H	38.69	-22.80	15.89	60.83	44.94	Spurious
PK	867.838	V	38.06	/	/	80.83	42.77	Spurious
AV	867.838	V	38.06	-22.80	15.26	60.83	45.57	Spurious
Above 1GHz								
PK	*1301.875	H	36.04	/	/	74	37.96	Restricted band
AV	*1301.875	H	36.04	-22.80	13.24	54	40.76	Restricted band
PK	1735.680	H	34.48	/	/	80.83	46.35	Spurious
AV	1735.680	H	34.48	-22.80	11.68	60.83	49.15	Spurious
PK	4472.984	H	43.71	/	/	80.83	37.12	Spurious
AV	4472.984	H	43.71	-22.80	20.91	60.83	39.92	Spurious
PK	*1301.729	V	32.48	/	/	74	41.52	Restricted band
AV	*1301.729	V	32.48	-22.80	9.68	54	44.32	Restricted band
PK	2603.729	V	38.50	/	/	74	35.50	Spurious
AV	2603.729	V	38.50	-22.80	15.70	54	38.30	Spurious
PK	3471.729	V	46.05	/	/	74	27.95	Spurious
AV	3471.729	V	46.05	-22.80	23.25	54	30.75	Spurious

Remark:

- 1: AV Emission Level= PK Emission Level+20log (duty cycle)
- 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
5. Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz)
6. Corrected Reading = Original Receiver Reading + Correct Factor
7. Only the worst data listed in this report

Duty Cycle = 7.246ms/100 (ms) =7.246%

Duty Cycle Factor =20log (Duty Cycle) =-22.80



Date: 27.FEB.2025 13:49:51



10.3 20dB 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.
Use the following test receiver settings:
RBW = 1% to 5% of the OBW, VBW \geq 3RBW, 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.

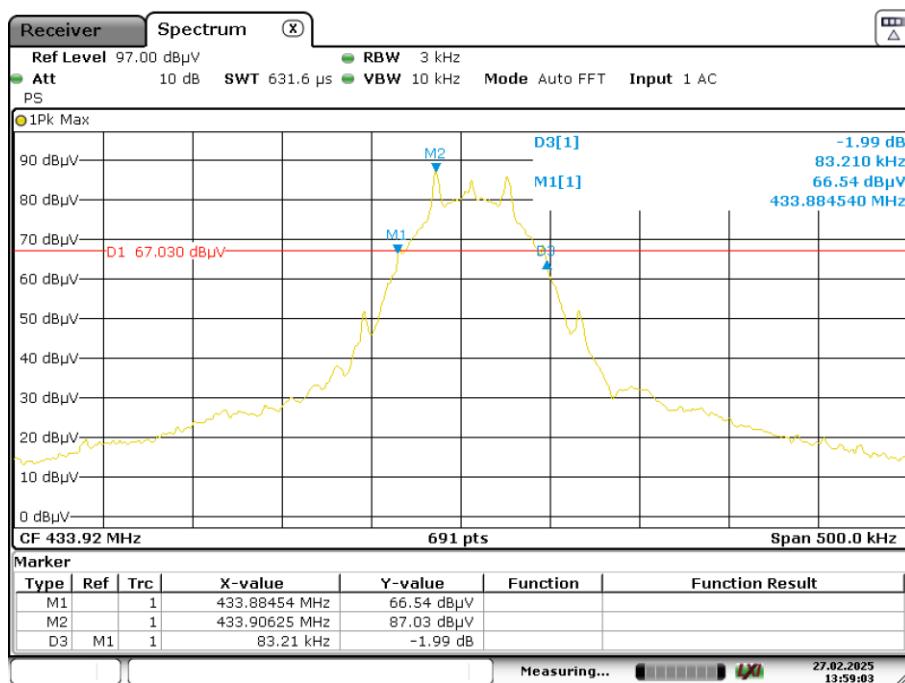
Limit

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% * 433.92 MHz = 1084.8 kHz

Test Result

Channel	20dB Bandwidth (KHz)	Limit (KHz)	Result
1	83.21KHz	\leq 1084.8	Pass



Date: 27.FEB.2025 13:59:03



10.4 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	Limit	Result
1	433.92MHz	292.75ms	≤5s	Pass





11 Test Equipment List

List of Test Instruments

Test Site1

RF Conductive Test

Description	Model no.	Manufacturer	Equipment ID.	Calibration Date	Calibration Due
Signal and spectrum analyzer	FSV40	R&S	S1503003-YQ-EMC	2024-8-01	2025-7-31

Conducted Emission

Description	Model no.	Manufacturer	Equipment ID.	Calibration Date	Calibration Due
EMI test receiver	ESR3	R&S	S1503001-YQ-EMC	2024-8-01	2025-7-31
2-Line V-network	ENV216	R & S	S1503103-YQ-EMC	2024-8-01	2025-7-31
Coaxial cable	RG400	HUBER+SUHNER	1002115055	2024-8-01	2025-7-31

Radiated Emission Test

USED	Equipment Name	Model	Manufacturer	Equipment ID.	Calibration Date	Calibration Due
<input checked="" type="checkbox"/>	EMI test receiver	ESR3	R&S	S1503109-YQ-EMC	2024-8-01	2025-7-31
<input checked="" type="checkbox"/>	Trilog super broadband test antenna	SCHWARZBECK	VULB9168	S1808296-YQ-EMC	2024-8-30	2025-8-29
<input checked="" type="checkbox"/>	Double-ridged waveguide horn antenna	HF907	R&S	S1503009-YQ-EMC	2024-4-14	2025-4-13
<input checked="" type="checkbox"/>	Pre-amplifier	HPA-081843	Shenzhen HzEMC	S2403437-YQ-EMC	2024-4-16	2025-4-15
<input checked="" type="checkbox"/>	Signal and spectrum analyzer	FSV40	R&S	S1503003-YQ-EMC	2024-8-01	2025-7-31
<input checked="" type="checkbox"/>	Loop antenna	HFH2-Z2	R&S	S1503013-YQ-EMC	2024-6-26	2025-6-25
<input checked="" type="checkbox"/>	Coaxial cable	MWX221	JUNFLON	1906S057	2024-8-01	2025-7-31
<input checked="" type="checkbox"/>	Coaxial cable	RG214	HUBER+SUHNER	1358176	2024-8-01	2025-7-31
<input checked="" type="checkbox"/>	Coaxial cable	MWX221	JUNFLON	J12J102482	2024-8-01	2025-7-31

Measurement Software Information

Test Item	Software	Manufacturer	Version
RE	EMC 32	Rohde & Schwarz	V10.50.40
CE	EMC 32	Rohde & Schwarz	V9.15.03



12 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

Items	Extended Uncertainty
Conducted Disturbance at Mains Terminals	150kHz to 30MHz, LISN, 3.16dB
Radiated Disturbance	9kHz to 30MHz, 3.52dB 30MHz to 1GHz, 5.03dB (Horizontal) 5.12dB (Vertical) 1GHz to 18GHz, 5.49dB

Measurement Uncertainty Decision Rule:

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2023, clause 4.3.3.



13 Photographs of Test Set-ups

Refer to the < Test Setup photos >.



14 Photographs of EUT

Refer to the < External Photos > & < Internal Photos >.

THE END