FCC - TEST REPORT

Report Number	:	709502408754-00B	Date of Issue:	October 21, 2024
Model	:	CM-08		
Product Type	:	HONEYCOMB MOTOR		
Applicant	:	Coulisse B.V.		
Address	:	Vonderweg 48, 7468 DC Enter, THE NETHERLANDS		
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	:	■ Positive ☐ Negative		
Total pages including Appendices	:	24		

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This revised report replaced all the version issued before.

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2 Details about the Test Laboratory & Report Modification Record

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
Telephone:	+86 21 6141 0123
Fax:	+86 21 6140 8600
FCC Registration No.:	820234
FCC Designation Number:	CN1183
ISED CAB identifier	CN0101
IC Registration No.:	31668

3 Description of the Equipment Under Test

Product:	HONEYCOMB MOTOR
Model no.:	CM-08
FCC ID:	ZY4CM08B1
IC:	NA
Options and accessories:	NA
Rating:	5VDC
RF Transmission Frequency:	SRD transceiver: 433.92MHz; 2.4GHz BLE: 2402~2480 MHz
No. of Operated Channel:	SRD transceiver: 1; 2.4GHz BLE: 40
Modulation:	SRD transceiver: FSK; 2.4GHz BLE: GFSK
Channel list:	SRD transceiver: 433.92MHz; 2.4GHz BLE:

Bluetooth Low Energy							
Ch	Fre(MHz)	Ch	Fre(MHz)	Ch	Fre(MHz)	Ch	Fre(MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

Antenna Type:	SRD transceiver: Line Antenna; 2.4GHz BLE: Line Antenna
Antenna Gain:	SRD transceiver: -4dBi; 2.4GHz BLE: 3.5dBi

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Description of the EUT:	The Equipment Under Test (EUT) is a HONEYCOMB MOTOR with BLE function and SRD function (transceiver). We tested it and listed the worst data in this report.
Test sample no.:	SHA-831821-2

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.

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4 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.

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5 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)	**Radiated Emission, 30MHz to 4.5GHz**	**14-17**	**3m chamber**	**Pass**
§15.231(c)	**Bandwidth Measurement**	**18**	**Shield room**	**Pass**
§15.231(a)(1)	**Deactivation Time**	**19**	**Shield room**	**Pass**
§15.203	**Antenna requirement**	**--**	**See Note 2**	**Pass**

Remark 1: N/A – Not Applicable. Conducted emission is not apply for battery operated device.
Note 1: The EUT uses a Line Antenna, which gain is -4dBi for SRD transceiver and 3.5dBi for 2.4GHz BLE. 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: ZY4CM08B1 complies with Section 15.207, 15.205, 15.209, 15.231 of the FCC Part 15, Subpart C Rules.

This report is only for the 433.92MHz test report, for the 2.4GHz BLE test report please refer to709502408754-00C.

We tested it and listed the worst data in this report.

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:	July 15, 2024
Testing Start Date:	August 9, 2024
Testing End Date:	September 11, 2024

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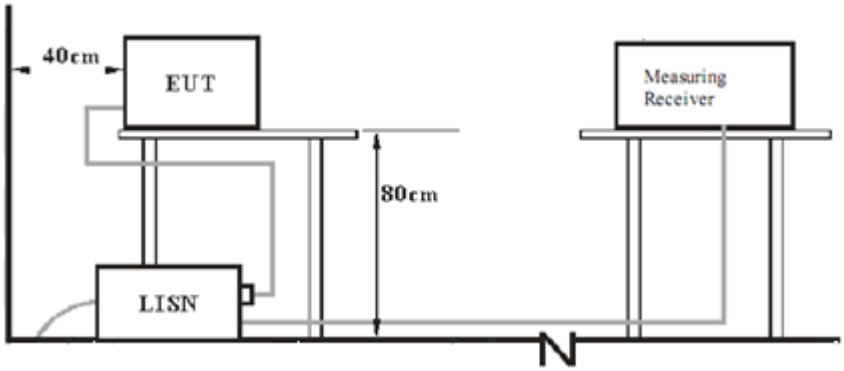
Reviewed by:	Prepared by:	Tested by:
Hui TONG	Wenqiang LU	Tianji XU
EMC Section Manager	EMC Project Engineer	EMC Test Engineer

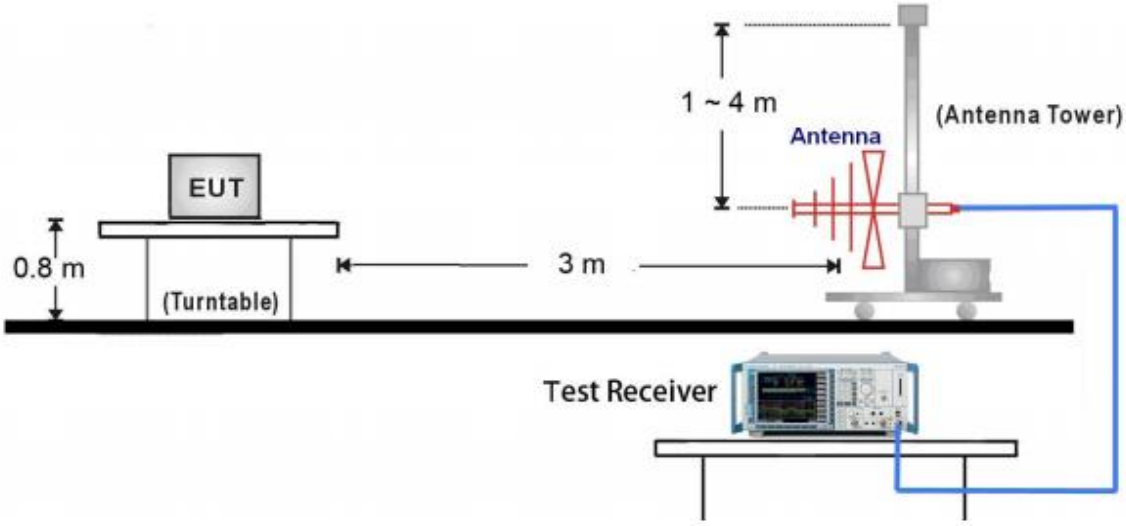
7 Test Setups

8.1 AC Power Line Conducted Emission test setups



8.2 Radiated test setups

30MHz ~ 1GHz Test Setup:



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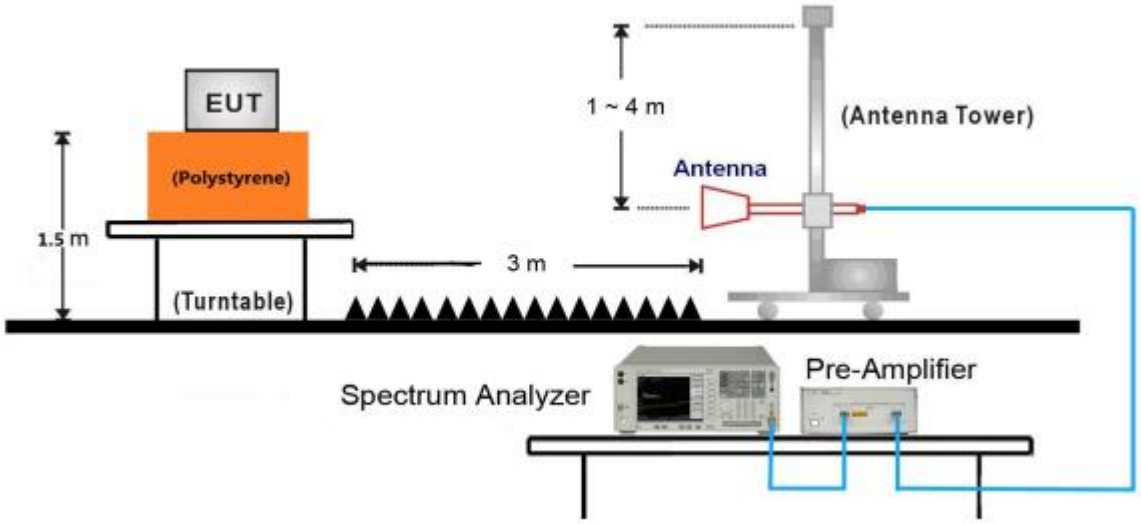
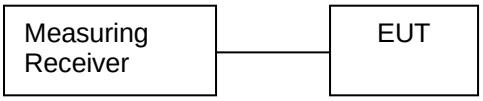
Above 1GHz Test Setup:



8.3 Conducted RF test setups



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8 Test Methodology

8.1 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 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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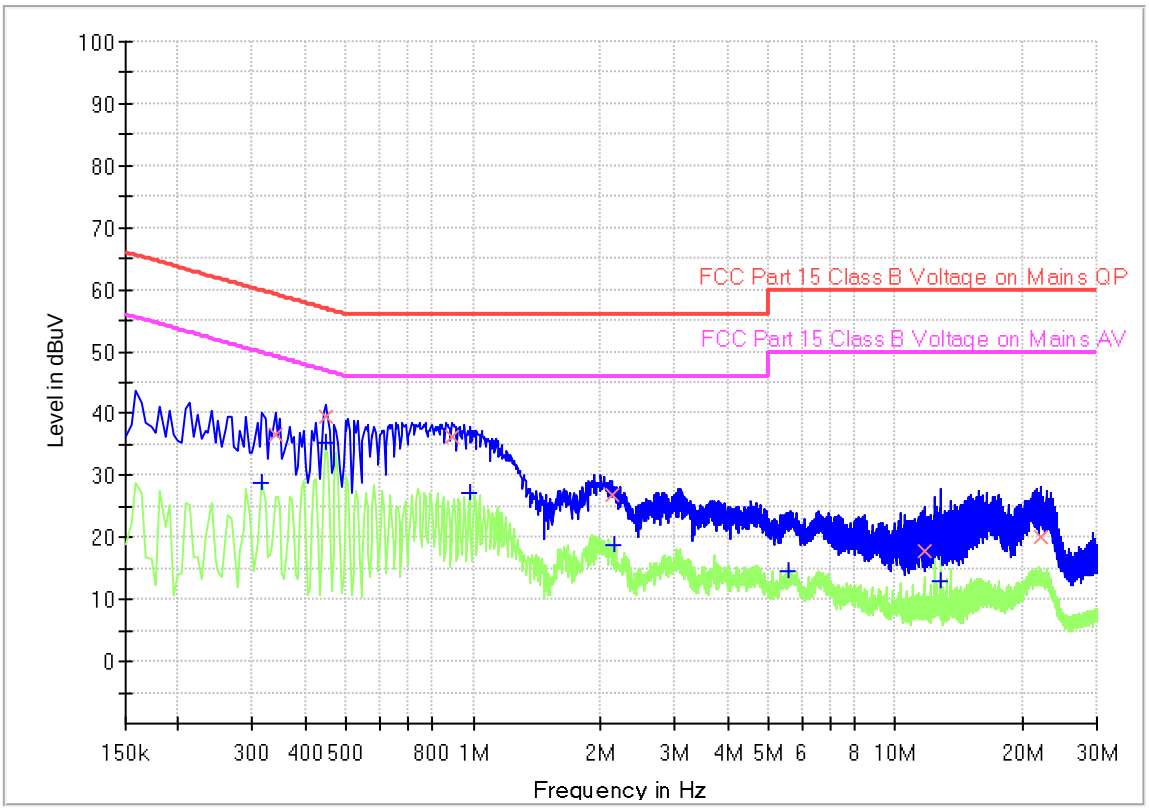
Conducted Emission Test 0.15MHz – 30MHz

Product Type	:	HONEYCOMB MOTOR
M/N	:	CM-08
Operating Condition	:	Mode: Tx 433.92MHz
Test Specification	:	L-line
Comment	:	AC 120V/60Hz (charging by adaptor)



Final_Result

Frequency (MHz)	Quasi Peak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.316500	---	28.94	49.80	20.86	1000.0	9.000	L1	19.5
0.339000	36.46	---	59.23	22.77	1000.0	9.000	L1	19.5
0.447000	---	35.36	46.93	11.57	1000.0	9.000	L1	19.5
0.447000	39.46	---	56.93	17.47	1000.0	9.000	L1	19.5
0.888000	36.37	---	56.00	19.63	1000.0	9.000	L1	19.5
0.978000	---	27.31	46.00	18.69	1000.0	9.000	L1	19.5
2.125500	26.80	---	56.00	29.20	1000.0	9.000	L1	19.5
2.148000	---	18.71	46.00	27.29	1000.0	9.000	L1	19.5
5.572500	---	14.44	50.00	35.56	1000.0	9.000	L1	19.6
11.710500	17.82	---	60.00	42.18	1000.0	9.000	L1	19.9
12.804000	---	12.82	50.00	37.18	1000.0	9.000	L1	19.9
22.155000	20.20	---	60.00	39.80	1000.0	9.000	L1	20.7

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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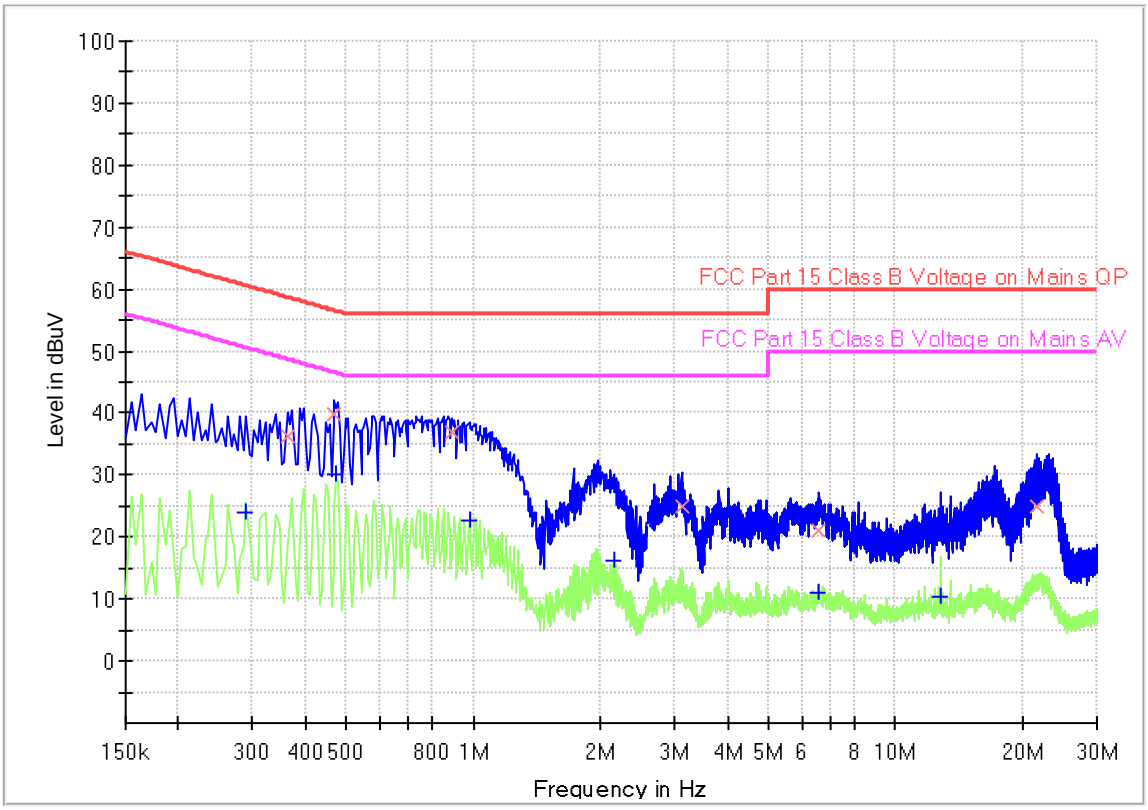
Product Type	:	HONEYCOMB MOTOR
M/N	:	CM-08
Operating Condition	:	Mode: Tx 433.92MHz
Test Specification	:	N-line
Comment	:	AC 120V/60Hz (charging by adaptor)



Final_Result

Frequency (MHz)	Quasi Peak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.289500	---	24.01	50.54	26.53	1000.0	9.000	N	19.5
0.361500	36.14	---	58.69	22.55	1000.0	9.000	N	19.5
0.469500	39.79	---	56.52	16.73	1000.0	9.000	N	19.5
0.474000	---	30.26	46.44	16.18	1000.0	9.000	N	19.5
0.888000	36.94	---	56.00	19.06	1000.0	9.000	N	19.5
0.978000	---	22.72	46.00	23.28	1000.0	9.000	N	19.5
2.148000	---	16.07	46.00	29.93	1000.0	9.000	N	19.5
3.111000	25.00	---	56.00	31.00	1000.0	9.000	N	19.5
6.562500	---	11.09	50.00	38.91	1000.0	9.000	N	19.6
6.603000	21.06	---	60.00	38.94	1000.0	9.000	N	19.6
12.795000	---	10.50	50.00	39.50	1000.0	9.000	N	19.8
21.633000	24.99	---	60.00	35.01	1000.0	9.000	N	20.4

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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8.2 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:
For Above 1GHz
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 1MHz, VBW≥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≥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 ≥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 20log (duty cycle)., derived from the appropriate duty cycle calculation.

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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

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

Limits for 15.209 & RSS-GEN Radiated emission limits; general requirements

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 Frequency **MHz**	E-Field Polarity	PK Emission **dBµV/m**	Average Factor **dB**	AV Emission **dBµV/m**	Limit **dBµV/m**	Margin	Emission Type
Below 1GHz								
PK	433.908	H	85.13	/	/	100.83	15.7	Fundamental
AV	433.908	H	85.13	-23.22	61.91	80.83	18.92	Fundamental
PK	433.908	V	81.78	/	/	100.83	19.05	Fundamental
AV	433.908	V	81.78	-23.22	58.56	80.83	22.27	Fundamental
PK	867.789	H	40.85	/	/	80.83	39.98	Spurious
AV	867.789	H	40.85	-23.22	17.63	60.83	63.20	Spurious
Above 1GHz								
PK	1301.933	H	30.89	/	/	74	43.11	Spurious
AV	1301.933	H	30.89	-23.22	8.84	54	45.16	Spurious
PK	1301.933	V	35.38	/	/	74	38.62	Spurious
AV	1301.933	V	30.54	-23.22	6.85	54	47.15	Spurious
PK	1735.583	V	33.67	/	/	80.83	47.16	Spurious
PK	1735.583	V	33.67	-23.22	11.53	60.83	49.30	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 = 6.9ms/100 (ms) =6.9%
Duty Cycle Factor =20log (Duty Cycle) =-23.22

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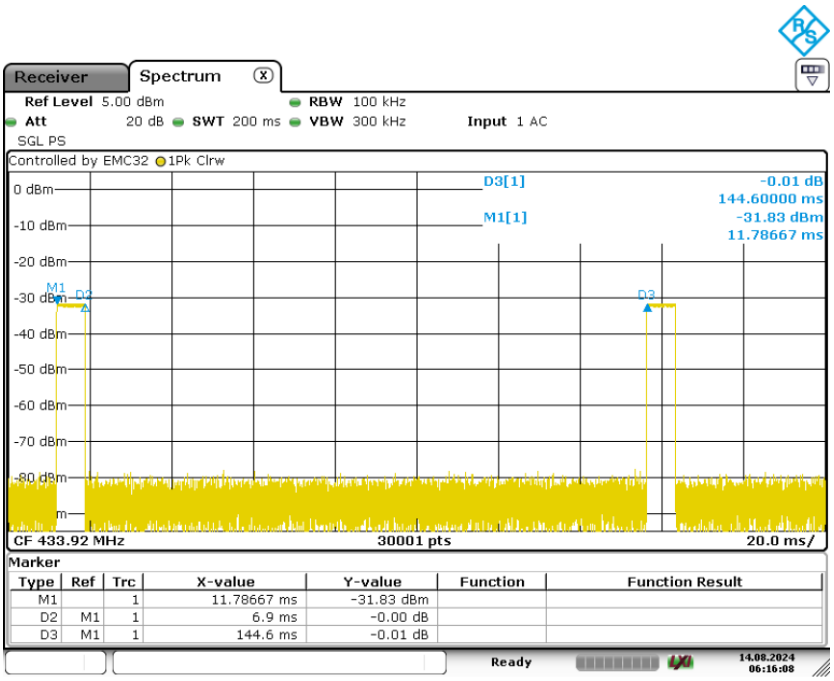

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8.3 Bandwidth Measurement

Test Method

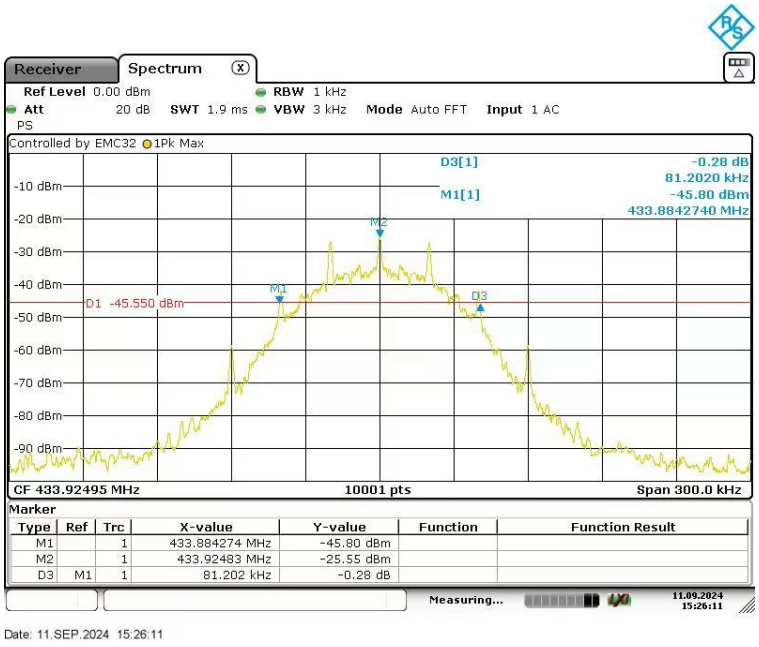
1. The EUT was placed on 0.8m height table, the RF output of EUT was connected to the test receiver by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Use the following test receiver settings:
   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% * 433.92 MHz = 1084.8 kHz

Test Result

Channel	20dB Bandwidth (KHz)	Limit (KHz)
1	81.20KHz	1084.8



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8.4 Deactivation Time

Test Method

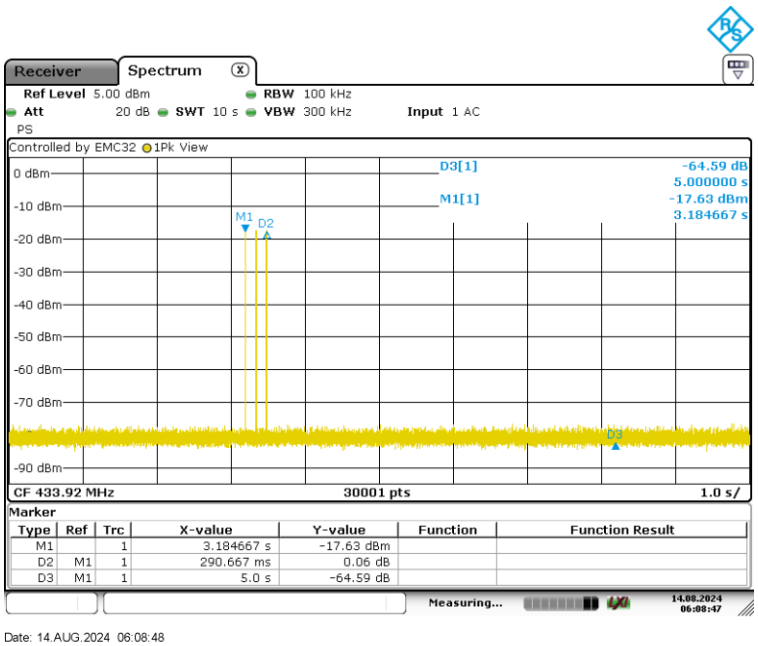
1. The EUT was placed on 0.8m height table, the RF output of EUT was connected to the test receiver by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT in transmitting mode.
3. Set center frequency of spectrum analyzer=operating frequency.
4. Set the spectrum analyzer as RBW≥OBW, VBW≥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	433.92MHz	290.7ms	Pass



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9 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
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10 Test Equipment List

List of Test Instruments

Test Site1

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DATE	CAL. DUE DATE
	EMI Test Receiver	Rohde & Schwarz	ESR3	101906	2024-8-1	2025-7-31
	Signal Analyzer	Rohde & Schwarz	FSV40	101091	2024-8-1	2025-7-31
	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9168	961	2021-9-23	2024-9-22
	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9168	961	2024-8-30	2025-8-29
	Double-ridged waveguide horn antenna	Rohde & Schwarz	HF907	102868	2024-4-14	2027-4-13
	Pre-amplifier	Shenzhen HzEMC	HPA-081843	HYPA23026	2024-4-16	2025-4-15
	Loop antenna	Rohde & Schwarz	HFH2-Z2	100443	2024-6-26	2025-6-25
	Double Ridged Horn Antenna	ETS-Lindgren	3116C	00246076	2023-7-7	2026-7-6
	3m Semi-anechoic chamber	TDK	9X6X6	----	2025-4-15	2027-5-7
CE	EMI Test Receiver	Rohde & Schwarz	ESR3	101907	2024-8-1	2025-7-31
	LISN	Rohde & Schwarz	ENV216	101924	2024-8-1	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

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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

Items	Extended Uncertainty
Conducted Disturbance at Mains Terminals	150kHz to 30MHz, LISN, 3.16dB
Radiated Disturbance	30MHz to 1GHz, 5.03dB (Horizontal) 5.12dB (Vertical) 1GHz to 18GHz, 5.49dB 18GHz to 40GHz, 5.63dB
Carrier power conducted measurement	50MHz~18GHz, 1.238dB
Spurious Emission Conducted Measurement	9kHz ~40GHz, 1.224dB

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.

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12 Photographs of Test Set-ups

Refer to the < Test Setup photos >.

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13 Photographs of EUT

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

THE END

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