FCC - TEST REPORT

Report Number	:	**709502501344-00A**	Date of Issue:	May 07, 2025
Model	:	DD7402H, DD7402HB, DD7412H, DD7412HB		
Product Type	:	15-Channel Emitter		
Applicant	:	Pro Design, LLC		
Address	:	1151 Campus Dr., 44224 Stow, OHIO, USA		
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	:	21		

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1 Table of Contents

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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
709502501344-00A	First Issue	May 07, 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 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

4 Description of the Equipment Under Test

Product:	15-Channel Emitter
Model no.:	DD7402H, DD7402HB, DD7412H, DD7412HB
FCC ID:	2BMF4DD7412H
IC:	NA
Options and accessories:	NA
Rating:	AAA 1.5VDC×2
RF Transmission Frequency:	SRD: 433.92MHz;
No. of Operated Channel:	SRD: 1;
Modulation:	SRD: 2GFSK;
Channel list:	SRD: 433.92MHz;
Antenna type:	PCB antenna
Description of the EUT:	The Equipment Under Test (EUT) is a 15-Channel Emitter with SRD function. We tested it and listed the worst data in this report.
Test sample no.:	SHA-893201-1

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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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.

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6 Summary of Test Results

Technical Requirements				
FCC Part 15 Subpart C				
Test Condition		Pages	Test Site	Test Result
§15.205, §15.209, 15.35 (c)§15.231(b)	The Field strength of Emissions	9-15	3m chamber	Pass
§15.231(c)	20dB Bandwidth Measurement	16	Shield room	Pass
§15.231(a)(1)	Deactivation Time	17	Shield room	Pass
§15.203	Antenna requirement	See Note 1		Pass

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

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7 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2BMF4DD7412H complies with Section 15.205, 15.209, 15.231 of the FCC Part 15, Subpart C Rules.

According to client's declaration, all models have same PCB layout, schematics and BOM. The differences are model name, number of buttons, brand name, appearance color and shell shape. Model DD7402HB was chosen to perform the full test items.

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 26, 2025
Testing Start Date:	March 4, 2025
Testing End Date:	March 10, 2025

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

Reviewed by:	Prepared by:	Tested by:
Hui TONG	Yan YANG	Chengjie GUO
EMC Section Manager	EMC Project Engineer	EMC Test Engineer

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8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
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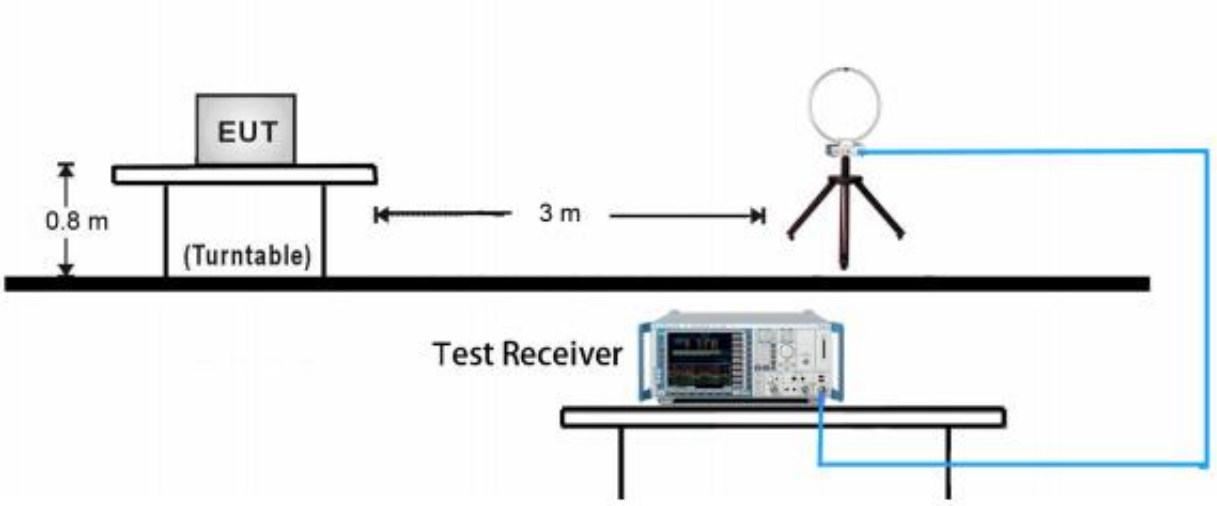
9 Test Setups

9.1 Radiated test setups

9kHz ~ 30MHz Test Setup:



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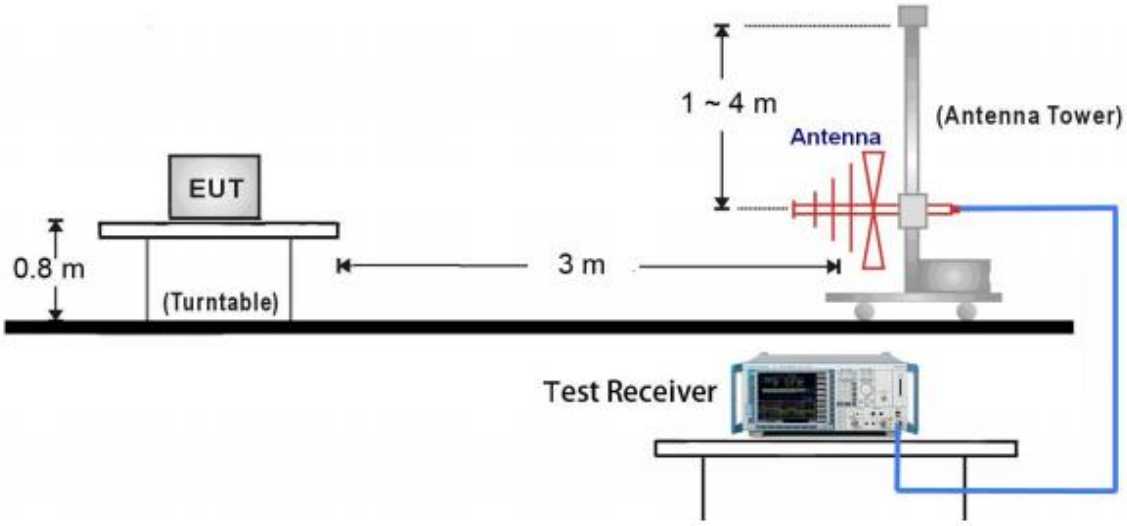
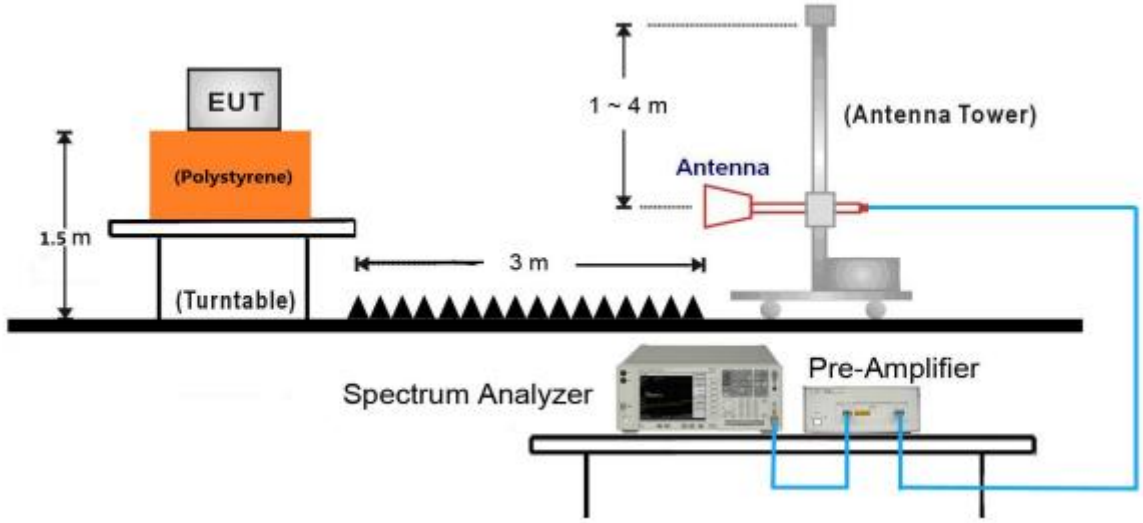
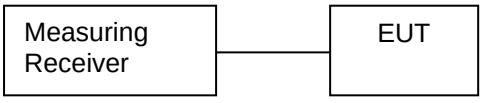
30MHz ~ 1GHz Test Setup:



Above 1GHz Test Setup:



9.2 Conducted RF test setups



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10 Test Methodology

10.1 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≥3RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

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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

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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	433.920	H	87.74	/	/	100.80	13.06	Fundamental
AV	433.920	H	87.74	-10.33	77.41	80.80	3.39	Fundamental
PK	433.920	V	77.86	/	/	100.80	22.94	Fundamental
AV	433.920	V	77.86	-10.33	67.53	80.80	13.27	Fundamental
PK	867.789	H	37.38	/	/	80.80	43.42	Spurious
AV	867.789	H	37.38	-10.33	27.05	60.80	33.75	Spurious
PK	867.498	V	38.58	/	/	80.80	42.22	Spurious
AV	867.498	V	38.58	-10.33	28.25	60.80	32.55	Spurious
Above 1GHz								
PK	*1301.656	H	29.86	/	/	74.00	44.14	Restricted band
AV	*1301.656	H	29.86	-10.33	19.53	54.00	34.47	Restricted band
PK	1735.680	H	32.21	/	/	80.80	48.59	Spurious
AV	1735.680	H	32.21	-10.33	21.88	60.80	38.92	Spurious
PK	*3905.109	H	44.84	/	/	74.00	29.16	Restricted band
AV	*3905.109	H	44.84	-10.33	34.51	54.00	19.49	Restricted band
PK	*1301.760	V	29.07	/	/	74.00	44.93	Restricted band
AV	*1301.760	V	29.07	-10.33	18.74	54.00	35.26	Restricted band
PK	1735.680	V	31.98	/	/	80.80	48.82	Spurious
AV	1735.680	V	31.98	-10.33	21.65	60.80	39.15	Spurious
PK	*3904.891	V	43.06	/	/	74.00	30.94	Restricted band
AV	*3904.891	V	43.06	-10.33	32.73	54.00	21.27	Restricted band

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 = 30.435ms/100 (ms) =30.435%
Duty Cycle Factor =20log (Duty Cycle) =-10.33

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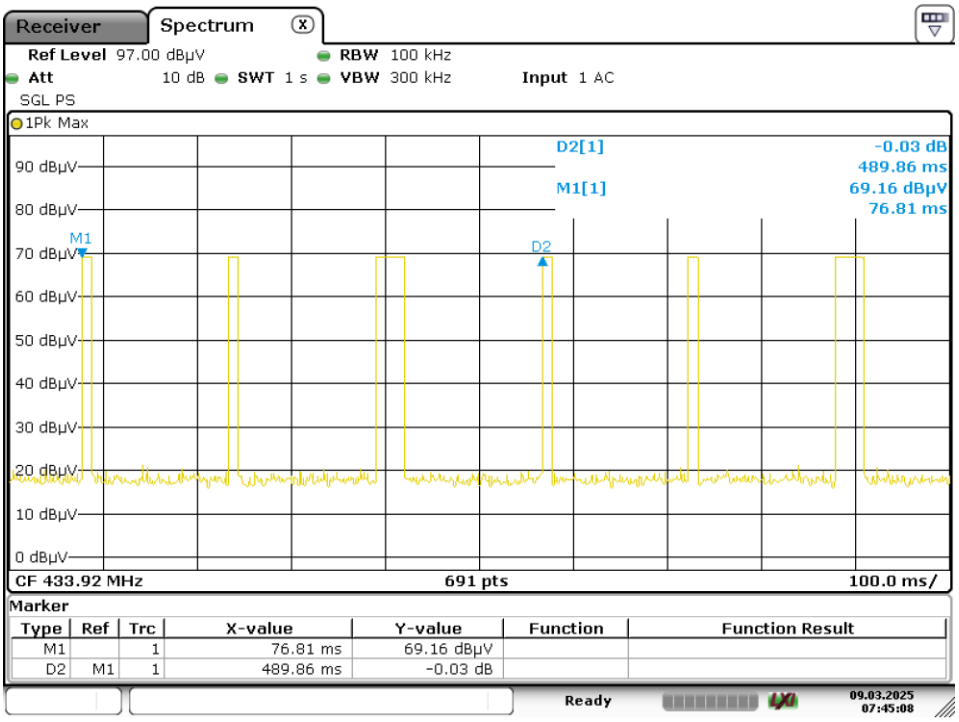

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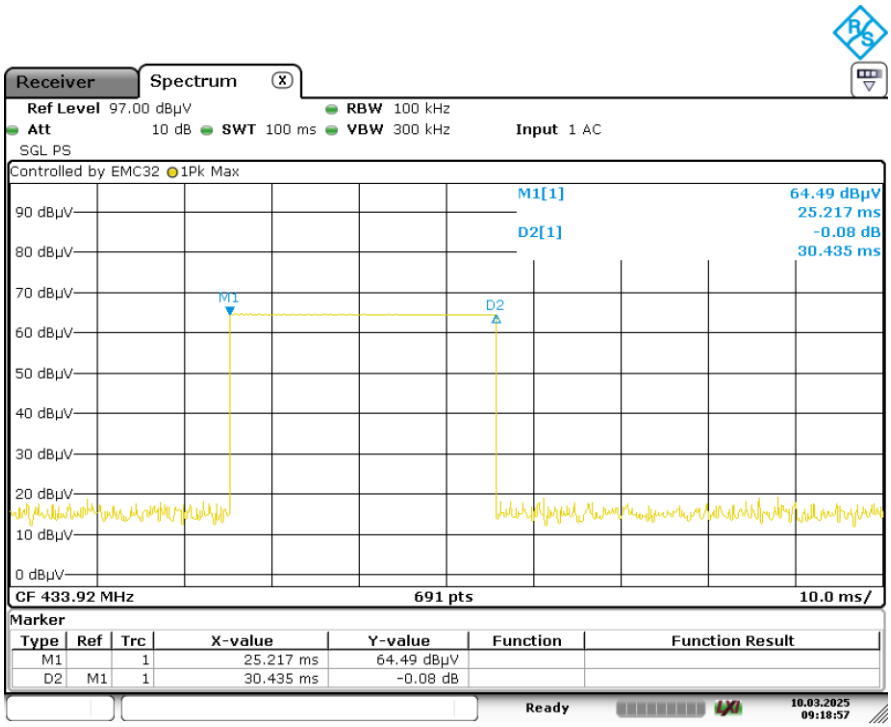

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10.2 20dB Bandwidth Measurement

Test Method

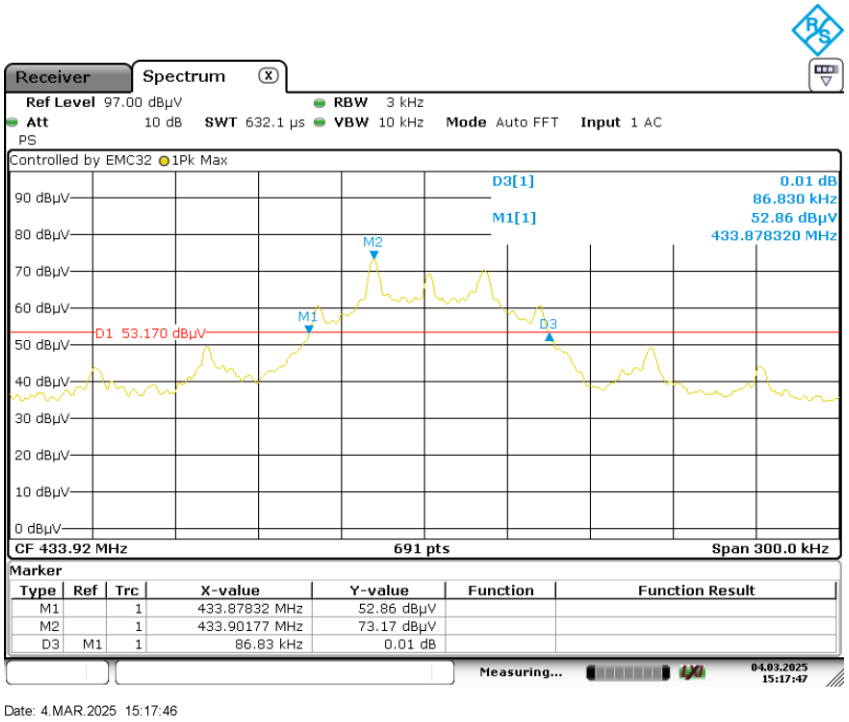
1. The EUT was placed on 0.8m height table, the RF output of EUT was connected to the test receiver by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
   Use the following test receiver settings:
   RBW = 1% to 5% of the OBW, VBW≥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
4. 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	86.83KHz	≤1084.8	Pass



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10.3 Deactivation Time

Test Method

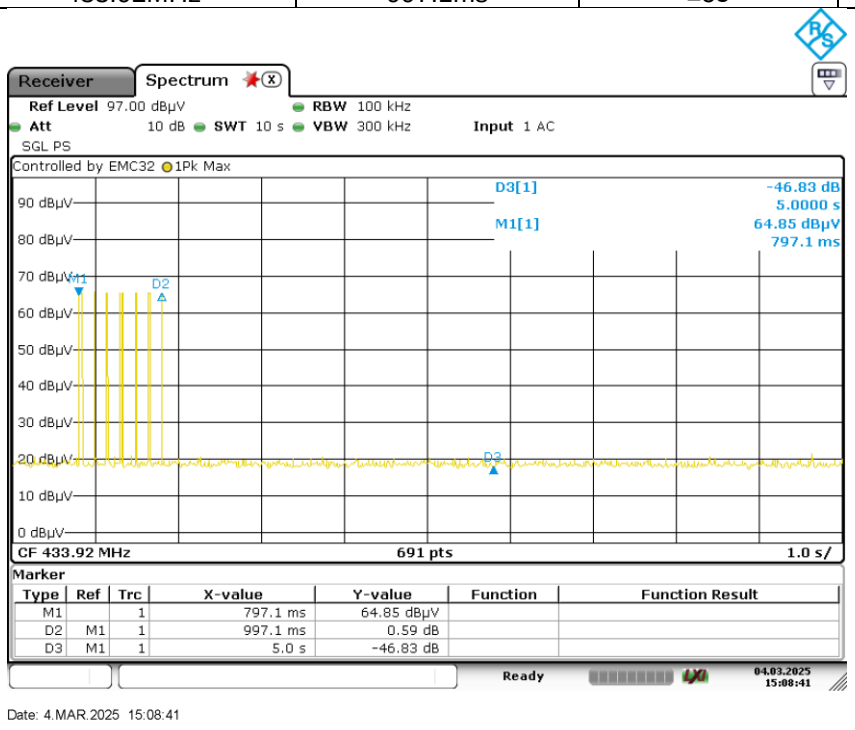
1. The EUT was placed on 0.8m height table, the RF output of EUT was connected to the test receiver by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT in transmitting mode.
3. Set center frequency of spectrum analyzer=operating 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	Limit	Result
1	433.92MHz	997.1ms	≤5s	Pass



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11 Test Equipment List

List of Test Instruments

Test Site1

RF Conductive Test

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

Radiated Emission Test

USED	Equipment Name	Model	Manufacturer	Equipment ID.	Calibration Date	Calibration Due
☒	EMI test receiver	ESR3	R&S	S1503109-YQ-EMC	2024-8-01	2025-7-31
☒	Trilog super broadband test antenna	SCHWARZBECK	VULB9168	S1808296-YQ-EMC	2024-8-30	2025-8-29
☒	Double-ridged waveguide horn antenna	HF907	R&S	S1503009-YQ-EMC	2024-4-14	2025-4-13
☒	Pre-amplifier	HPAP-9K0130	Shenzhen HzEMC	S2110423b-YQ-EMC	2024-8-01	2025-7-31
☒	Signal and spectrum analyzer	FSV40	R&S	S1503003-YQ-EMC	2024-8-01	2025-7-31
☒	Loop antenna	HFH2-Z2	R&S	S1503013-YQ-EMC	2024-6-26	2025-6-25

Measurement Software Information			
Test Item	Software	Manufacturer	Version
RE	EMC 32	Rohde & Schwarz	V10.50.40

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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
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.

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13 Photographs of Test Set-ups

Refer to the < Test Setup photos >.

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14 Photographs of EUT

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

THE END

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