




TEST REPORT

FCC ID..... :	ZPY-CASCADE98	
Test Report No..... :	TCT230109E032	
Date of issue..... :	Jan. 16, 2023	
Testing laboratory	SHENZHEN TONGCE TESTING LAB	
Testing location/ address:	2101 & 2201, Zhenchang Factory, Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, 518103, People's Republic of China	
Applicant's name..... :	AZIO Corporation	
Address..... :	19933 Harrison Ave. City of Industry, California 91789, United States	
Manufacturer's name ... :	AZIO Corporation	
Address..... :	19933 Harrison Ave. City of Industry, California 91789, United States	
Standard(s)	FCC CFR Title 47 Part 15 Subpart C Section 15.249 ANSI C63.10:2013	
Product Name..... :	KEYBOARD	
Trade Mark	AZIO	
Model/Type reference..... :	CASCADE 98, Cascade 98 Slim, CRG2G191, CRG1G191, CRG4G191, CSG10394, CSG20394, CSG40394, CRBB91, CRBB94, CSBB91, CSBB94, CRGXXXXX, CSGXXXXX(X: Letter A-Z, number 0-9, or space, used to distinguish between different customers, different colors, different packaging, do not affect the product safety and electromagnetic compatibility.)	
Rating(s)..... :	Rechargeable Li-ion Battery DC 3.7V	
Date of receipt of test item	Jan. 09, 2023	
Date (s) of performance of test..... :	Jan. 09, 2023 - Jan. 16, 2023	
Tested by (+signature) ... :	Rleo LIU	
Check by (+signature).... :	Beryl ZHAO	
Approved by (+signature):	Tomsin	



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1. General Product Information

1.1. EUT description

Product Name.....:	KEYBOARD
Model/Type reference.....:	CASCADE 98
Sample Number.....:	TCT230109E031-0101
Operation Frequency	2403MHz~2480MHz
Channel Separation	1MHz
Number of Channel	78
Modulation Technology	GFSK
Antenna Type.....:	PCB Antenna
Antenna Gain.....:	2.34dBi
Rating(s).....:	Rechargeable Li-ion Battery DC 3.7V

Note: The antenna gain listed in this report is provided by applicant, and the test laboratory is not responsible for this parameter.

1.2. Model(s) list

No.	Model No.	Tested with
1	CASCADE 98	<input checked="" type="checkbox"/>
Other models	Cascade 98 Slim, CRG2G191, CRG1G191, CRG4G191, CSG10394, CSG20394, CSG40394, CRBB91, CRBB94, CSBB91, CSBB94, CRGXXXXX, CSGXXXXX(X: Letter A-Z, number 0-9, or space, used to distinguish between different customers, different colors, different packaging, do not affect the product safety and electromagnetic compatibility.)	<input type="checkbox"/>

Note: CASCADE 98 is tested model, other models are derivative models.

1.3. Operation Frequency

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2403MHz	19	2422MHz	39	2442MHz	59	2462MHz
1	2404MHz	20	2423MHz	40	2443MHz	60	2463MHz
...
9	2412MHz	29	2432MHz	49	2452MHz	69	2472MHz
10	2413MHz	30	2433MHz	50	2453MHz	70	2473MHz
...
17	2420MHz	37	2440MHz	57	2460MHz	77	2480MHz
18	2421MHz	38	2441MHz	58	2461MHz	-	

Remark: Channel 0, 38 & 77 have been tested for GFSK modulation mode.

2. Test Result Summary

Requirement	CFR 47 Section	Result
Antenna Requirement	§15.203	PASS
AC Power Line Conducted Emission	§15.207	PASS
Field Strength of Fundamental	§15.249 (a)	PASS
Spurious Emissions	§15.249 (a) (d)/ §15.209	PASS
Band Edge	§15.249 (d)/ §15.205	PASS
20dB Occupied Bandwidth	§15.215 (c)	PASS

Note:

1. Pass: Test item meets the requirement.
2. Fail: Test item does not meet the requirement.
3. N/A: Test case does not apply to the test object.
4. The test result judgment is decided by the limit of test standard.

3. General Information

3.1. Test Environment and Mode

Operating Environment:		
Condition	Conducted Emission	Radiated Emission
Temperature:	25.3 °C	24.1 °C
Humidity:	56 % RH	52 % RH
Atmospheric Pressure:	1010 mbar	1010 mbar
Test Mode:		
Engineering mode:	Keep the EUT in continuous transmitting by select channel and modulations with Fully-charged battery	
The sample was placed 0.8m & 1.5m for the measurement below & above 1GHz above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case(Z axis) are shown in Test Results of the following pages.		

3.2. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
Notebook Computer	G3 3500	00342-36088-99832 -AAOEM	/	DELL
Power supply	HA130PM190	CN-0CY0JM-CH200 -0B6-7405-A01	/	DELL

Note:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4. Facilities and Accreditations

4.1. Facilities

The test facility is recognized, certified, or accredited by the following organizations:

- FCC - Registration No.: 645098

SHENZHEN TONGCE TESTING LAB

Designation Number: CN1205

The testing lab has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

- IC - Registration No.: 10668A-1

SHENZHEN TONGCE TESTING LAB

CAB identifier: CN0031

The testing lab has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing.

4.2. Location

SHENZHEN TONGCE TESTING LAB

Address: 2101 & 2201, Zhenchang Factory Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, 518103, People's Republic of China

TEL: +86-755-27673339

4.3. Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission	± 3.10 dB
2	RF power, conducted	± 0.12 dB
3	Spurious emissions, conducted	± 0.11 dB
4	All emissions, radiated(<1 GHz)	± 4.56 dB
5	All emissions, radiated(1 GHz - 18 GHz)	± 4.22 dB
6	All emissions, radiated(18 GHz- 40 GHz)	± 4.36 dB

5. Test Results and Measurement Data

5.1. Antenna Requirement

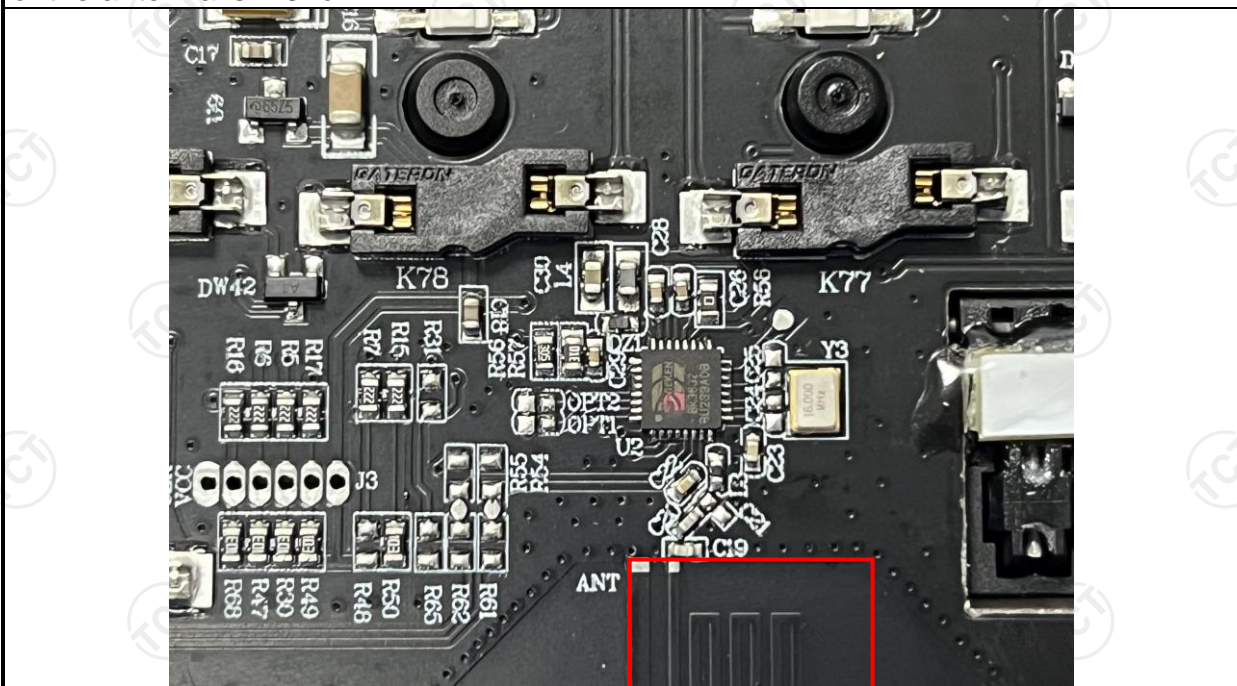
Standard requirement:	FCC Part15 C Section 15.203
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15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

E.U.T Antenna:	
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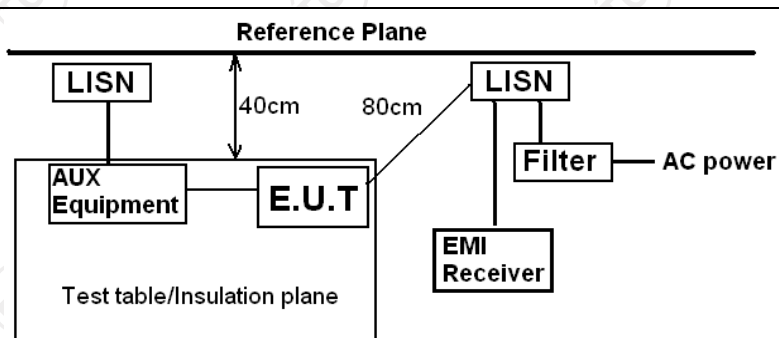
The EUT antenna is PCB antenna which permanently attached, and the best case gain of the antenna is 2.34dBi.



Antenna

5.2. Conducted Emission

5.2.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.207														
Test Method:	ANSI C63.10:2013														
Frequency Range:	150 kHz to 30 MHz														
Receiver setup:	RBW=9 kHz, VBW=30 kHz, Sweep time=auto														
Limits:	<table><tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBuV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></tr><tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr><tr><td>0.5-5</td><td>56</td><td>46</td></tr><tr><td>5-30</td><td>60</td><td>50</td></tr></table>	Frequency range (MHz)	Limit (dBuV)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dBuV)														
	Quasi-peak	Average													
0.15-0.5	66 to 56*	56 to 46*													
0.5-5	56	46													
5-30	60	50													
Test Setup:	<div><p>Reference Plane</p><p>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p></div>														
Test Mode:	Charging + Transmitting Mode														
Test Procedure:	<div><div>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</div><div>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</div><div>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.</div></div>														
Test Result:	PASS														

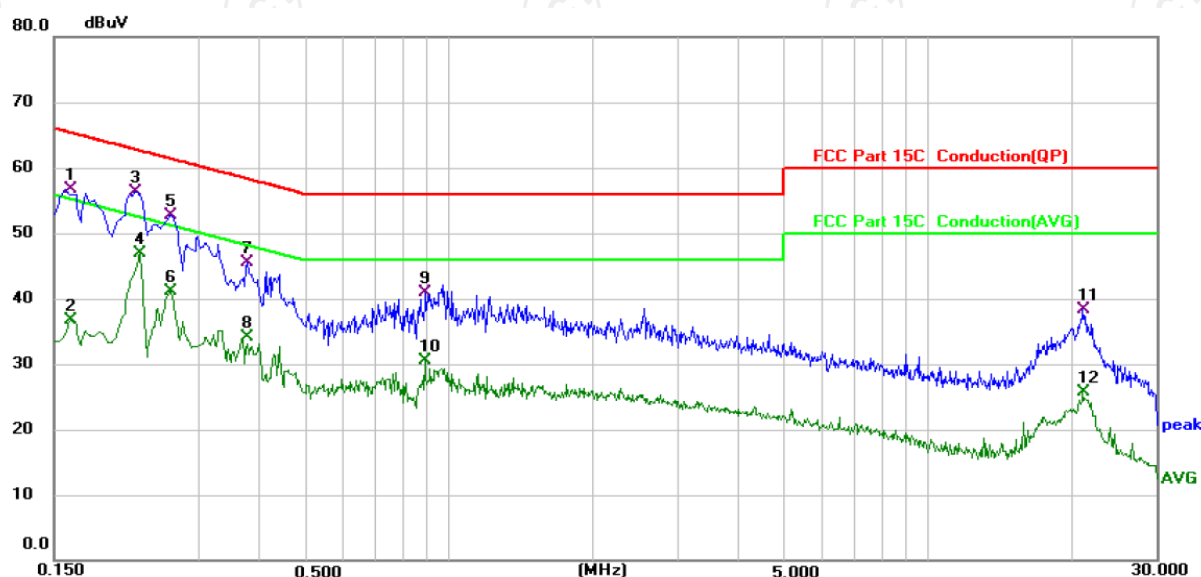
5.2.2. Test Instruments

Conducted Emission Shielding Room Test Site (843)				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESCI3	100898	Jul. 03, 2023
Line Impedance Stabilisation Newtork(LISN)	Schwarzbeck	NSLK 8126	8126453	Feb. 24, 2023
Line-5	TCT	CE-05	/	Jul. 03, 2024
EMI Test Software	Shurple Technology	EZ-EMC	/	/

5.2.3. Test data

Please refer to following diagram for individual

Conducted Emission on Line Terminal of the power line (150 kHz to 30MHz)



Site 844 Shielding Room

Phase: L1

Temperature: 25.3 (°C)

Humidity: 56 %

Limit: FCC Part 15C Conduction(QP)

Power: DC 5 V(Adapter Input AC 120 V/60 Hz)

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1620	46.19	10.53	56.72	65.36	-8.64	QP	
2		0.1620	26.18	10.53	36.71	55.36	-18.65	AVG	
3		0.2220	46.12	10.28	56.40	62.74	-6.34	QP	
4	*	0.2260	36.57	10.28	46.85	52.60	-5.75	AVG	
5		0.2620	42.45	10.26	52.71	61.37	-8.66	QP	
6		0.2620	30.79	10.26	41.05	51.37	-10.32	AVG	
7		0.3780	35.25	10.21	45.46	58.32	-12.86	QP	
8		0.3780	23.88	10.21	34.09	48.32	-14.23	AVG	
9		0.8980	30.87	10.11	40.98	56.00	-15.02	QP	
10		0.8980	20.33	10.11	30.44	46.00	-15.56	AVG	
11		21.1220	27.78	10.45	38.23	60.00	-21.77	QP	
12		21.1220	15.16	10.45	25.61	50.00	-24.39	AVG	

Note:

Freq. = Emission frequency in MHz

Reading level (dBuV) = Receiver reading

Corr. Factor (dB) = LISN factor + Cable loss

Measurement (dBuV) = Reading level (dBuV) + Corr. Factor (dB)

Limit (dBuV) = Limit stated in standard

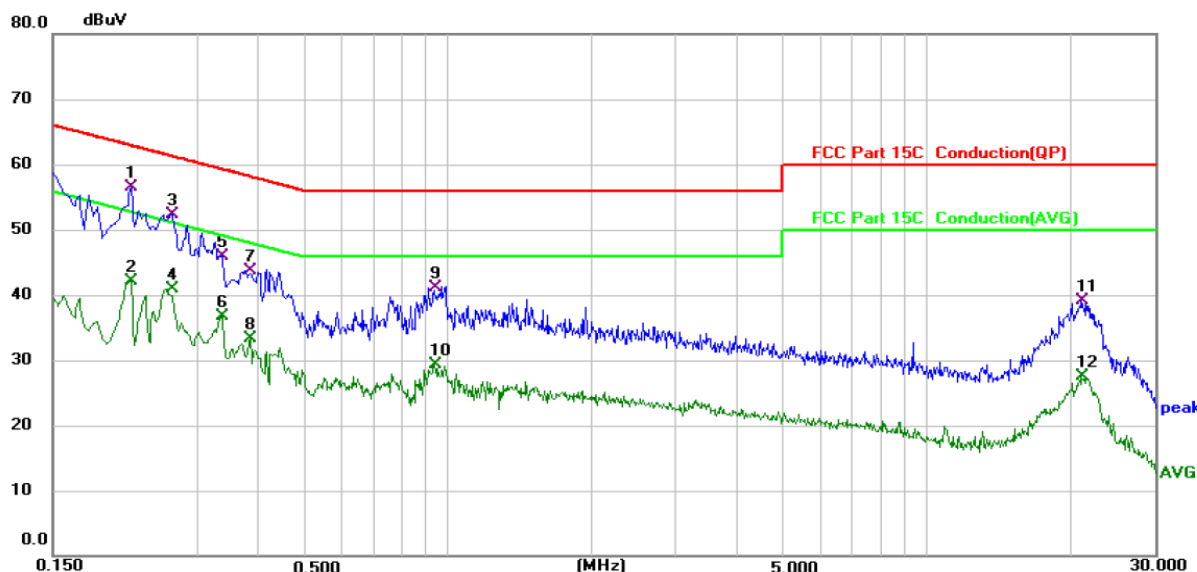
Margin (dB) = Measurement (dBuV) – Limits (dBuV)

Q.P. =Quasi-Peak

AVG =average

* is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz

Conducted Emission on Neutral Terminal of the power line (150 kHz to 30MHz)



Site 844 Shielding Room

Phase: **N**

Temperature: 25.3 (°C)

Humidity: 56 %

Limit: FCC Part 15C Conduction(QP)

Power: DC 5 V(Adapter Input AC 120 V/60 Hz)

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.2179	46.21	10.28	56.49	62.90	-6.41	QP	
2		0.2179	31.85	10.28	42.13	52.90	-10.77	AVG	
3		0.2660	42.13	10.26	52.39	61.24	-8.85	QP	
4		0.2660	30.63	10.26	40.89	51.24	-10.35	AVG	
5		0.3379	35.74	10.22	45.96	59.25	-13.29	QP	
6		0.3379	26.48	10.22	36.70	49.25	-12.55	AVG	
7		0.3860	33.55	10.21	43.76	58.15	-14.39	QP	
8		0.3860	23.19	10.21	33.40	48.15	-14.75	AVG	
9		0.9419	30.91	10.11	41.02	56.00	-14.98	QP	
10		0.9419	19.17	10.11	29.28	46.00	-16.72	AVG	
11		21.0459	28.60	10.44	39.04	60.00	-20.96	QP	
12		21.0459	17.06	10.44	27.50	50.00	-22.50	AVG	

Note1:

Freq. = Emission frequency in MHz

Reading level (dBuV) = Receiver reading

Corr. Factor (dB) = LISN factor + Cable loss

Measurement (dBuV) = Reading level (dBuV) + Corr. Factor (dB)

Limit (dBuV) = Limit stated in standard

Margin (dB) = Measurement (dBuV) – Limits (dBuV)

Q.P. =Quasi-Peak AVG =average

* is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz.

5.3. Radiated Emission Measurement

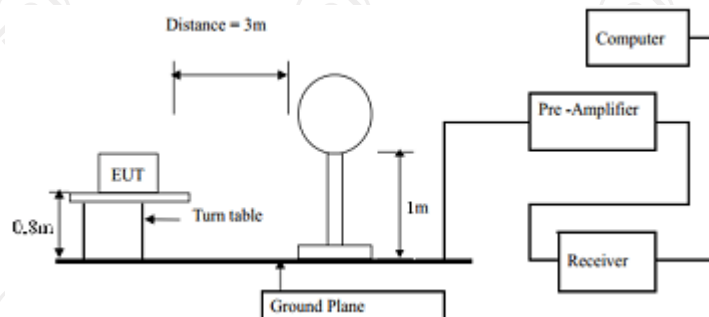
5.3.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.10:2013				
Frequency Range:	9 kHz to 25 GHz				
Measurement Distance:	3 m				
Antenna Polarization:	Horizontal & Vertical				
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value
	150kHz- 30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
Limit(Field strength of the fundamental signal):	Frequency		Limit (dBuV/m @3m)		Remark
	2400MHz-2483.5MHz		94.00		Average Value
			114.00		Peak Value
Limit(Spurious Emissions):	Frequency		Limit (dBuV/m @3m)		Remark
	0.009-0.490		2400/F(KHz)		Quasi-peak Value
	0.490-1.705		24000/F(KHz)		Quasi-peak Value
	1.705-30		30		Quasi-peak Value
	30MHz-88MHz		40.0		Quasi-peak Value
	88MHz-216MHz		43.5		Quasi-peak Value
	216MHz-960MHz		46.0		Quasi-peak Value
	960MHz-1GHz		54.0		Quasi-peak Value
	Above 1GHz		54.0		Average Value
Limit (band edge) :			74.0		Peak Value
	Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.				
Test Procedure:	<div>1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber in below 1GHz, 1.5m above the ground in above 1GHz. The table was rotated 360 degrees to determine the position of the highest radiation.</div> <div>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.</div> <div>3. The antenna height 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.</div>				

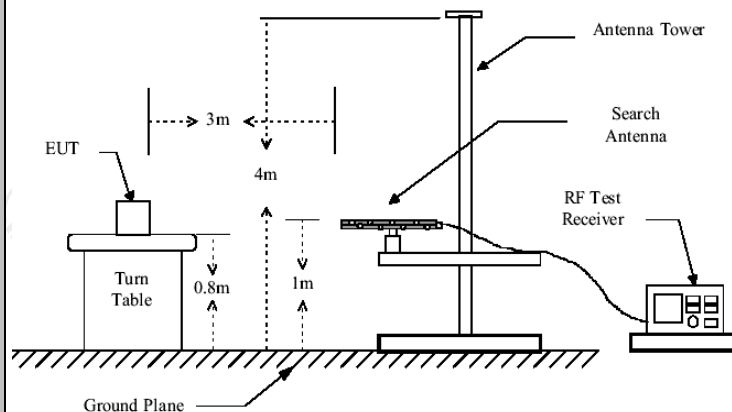
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Test setup:

For radiated emissions below 30MHz

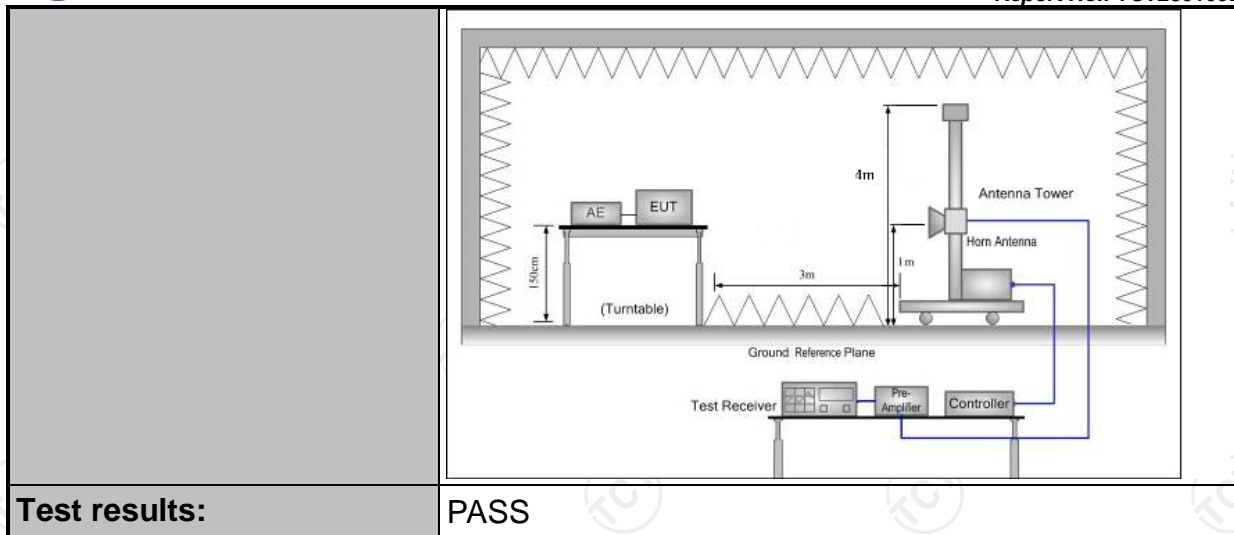


30MHz to 1GHz



Above 1GHz

(The diagram below shows the test setup that is utilized to make the measurements for emission from 1GHz to the tenth harmonic of the highest fundamental frequency or to 40GHz emissions, whichever is lower.)



Test results:

PASS

5.3.2. Test Instruments

Radiated Emission Test Site (966)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESIB7	100197	Jul. 03, 2023
Spectrum Analyzer	R&S	FSQ40	200061	Jul. 03, 2023
Pre-amplifier	SKET	LNPA_0118G-45	SK2021012102	Feb. 24, 2023
Pre-amplifier	SKET	LNPA_1840G-50	SK202109203500	Feb. 24, 2023
Pre-amplifier	HP	8447D	2727A05017	Jul. 03, 2023
Loop antenna	Schwarzbeck	FMZB1519B	00191	Jun. 11, 2024
Broadband Antenna	Schwarzbeck	VULB9163	340	Jul. 05, 2024
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Jul. 05, 2024
Horn Antenna	Schwarzbeck	BBHA 9170	00956	Apr. 10, 2023
Antenna Mast	Keleto	RE-AM	/	/
Coaxial cable	SKET	RC-18G-N-M	/	Feb. 24, 2024
Coaxial cable	SKET	RC_40G-K-M	/	Feb. 24, 2024
EMI Test Software	Shurple Technology	EZ-EMC	/	/

5.3.3. Test Data

Field Strength of Fundamental

Frequency (MHz)	Emission PK (dBuV/m)	Horizontal /Vertical	Limits PK (dBuV/m)	Margin (dB)
2403	83.27	H	114	-30.73
2403	81.39	V	114	-32.61
2441	81.92	H	114	-32.08
2441	80.33	V	114	-33.67
2480	82.03	H	114	-31.97
2480	78.66	V	114	-35.34

Frequency (MHz)	Emission AV (dBuV/m)	Horizontal /Vertical	Limits AV (dBuV/m)	Margin (dB)
2403	70.39	H	94	-23.61
2403	68.35	V	94	-25.65
2441	69.25	H	94	-24.75
2441	67.34	V	94	-26.66
2480	71.00	H	94	-23.00
2480	67.68	V	94	-26.32

Spurious Emissions

Frequency Range (9 kHz-30MHz)

Frequency (MHz)	Level@3m (dBμV/m)	Limit@3m (dBμV/m)
--	--	--
--	--	--
--	--	--
--	--	--

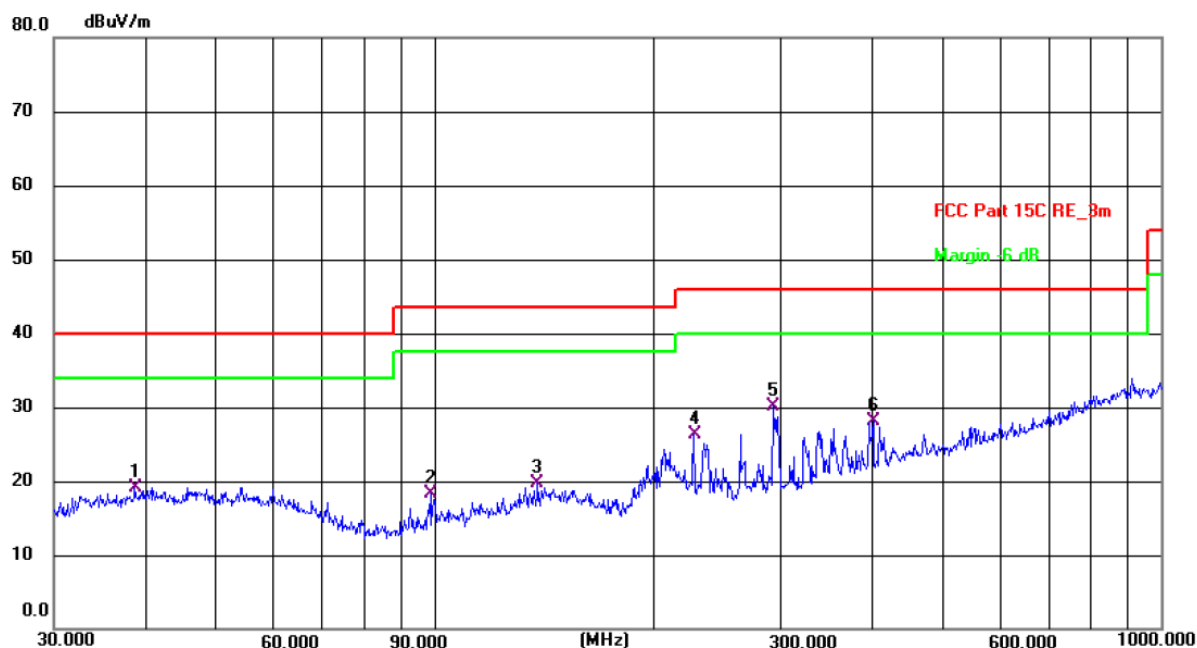
Note: 1. Emission Level=Reading+ Cable loss-Antenna factor-Amp factor.

2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement.

3. For fundamental frequency, RBW >20dB BW, VBW>=RBW, PK detector is for PK value, RMS detector is for AV value.

Frequency Range (30MHz-1GHz)

Horizontal:



Site #2 3m Anechoic Chamber

Polarization: **Horizontal**

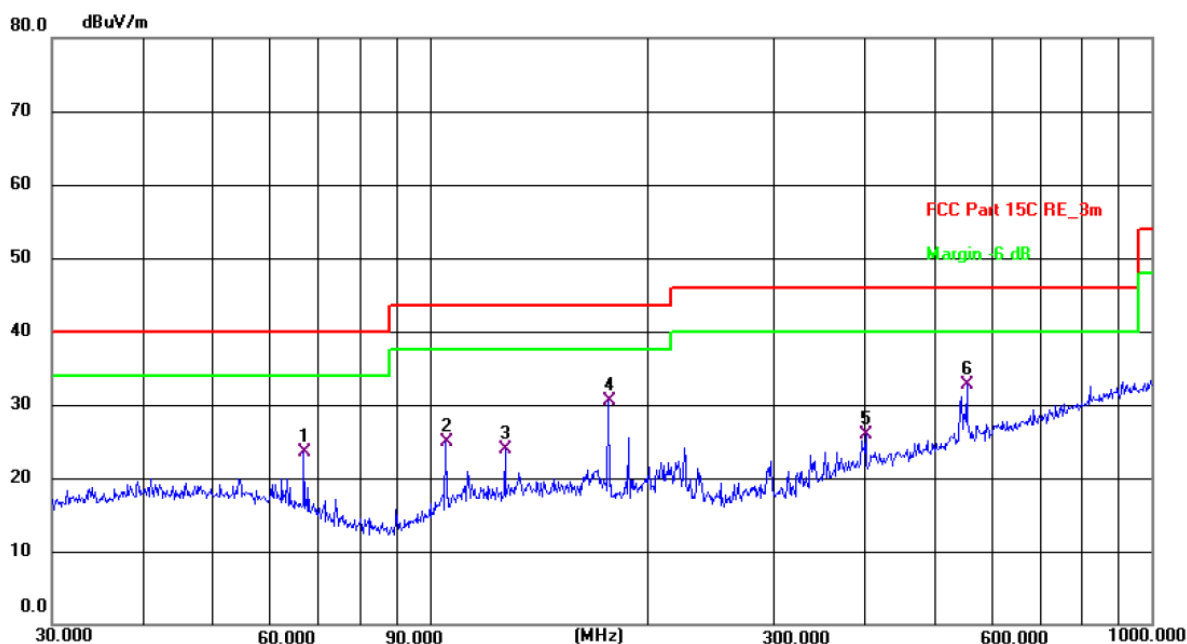
Temperature: 24.1(C) Humidity: 52 %

Limit: FCC Part 15C RE_3m

Power: DC 3.7 V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	38.7517	5.36	13.82	19.18	40.00	-20.82	QP	P	
2	98.8324	8.02	10.27	18.29	43.50	-25.21	QP	P	
3	138.8734	6.61	13.17	19.78	43.50	-23.72	QP	P	
4	227.6906	14.33	11.92	26.25	46.00	-19.75	QP	P	
5 *	293.0842	16.33	13.85	30.18	46.00	-15.82	QP	P	
6	401.8384	10.82	17.28	28.10	46.00	-17.90	QP	P	

Vertical:



Site #2 3m Anechoic Chamber

Polarization: **Vertical**

Temperature: 24.1(C)

Humidity: 52 %

Limit: FCC Part 15C RE_3m

Power: DC 3.7 V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	66.9669	11.72	11.70	23.42	40.00	-16.58	QP	P	
2	105.2717	14.06	10.83	24.89	43.50	-18.61	QP	P	
3	127.2176	11.38	12.43	23.81	43.50	-19.69	QP	P	
4 *	176.8878	18.83	11.61	30.44	43.50	-13.06	QP	P	
5	401.8384	8.68	17.28	25.96	46.00	-20.04	QP	P	
6	554.8254	12.20	20.43	32.63	46.00	-13.37	QP	P	

Note: Measurements were conducted in all channels (high, middle, low), and the worst case (Lowest channel) was submitted only.

Above 1GHz

Low channel: 2403MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
4806	H	48.02	---	-3.94	44.08	---	74	54	-9.92
7209	H	44.14	---	0.52	44.66	---	74	54	-9.34
---	---	---	---	---	---	---	---	---	---
4806	V	47.76	---	-3.94	43.82	---	74	54	-10.18
7209	V	42.37	---	0.52	42.89	---	74	54	-11.11
---	---	---	---	---	---	---	---	---	---

Middle channel: 2441MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
4882	H	47.42	---	-3.98	43.44	---	74	54	-10.56
7323	H	41.66	---	0.57	42.23	---	74	54	-11.77
---	---	---	---	---	---	---	---	---	---
4882	V	49.16	---	-3.98	45.18	---	74	54	-8.82
7323	V	43.87	---	0.57	44.44	---	74	54	-9.56
---	---	---	---	---	---	---	---	---	---

High channel: 2480MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
4960	H	47.73	---	-3.98	43.75	---	74	54	-10.25
7440	H	44.01	---	0.57	44.58	---	74	54	-9.42
---	---	---	---	---	---	---	---	---	---
4960	V	50.62	---	-3.98	46.64	---	74	54	-7.36
7440	V	44.17	---	0.57	44.74	---	74	54	-9.26
---	---	---	---	---	---	---	---	---	---

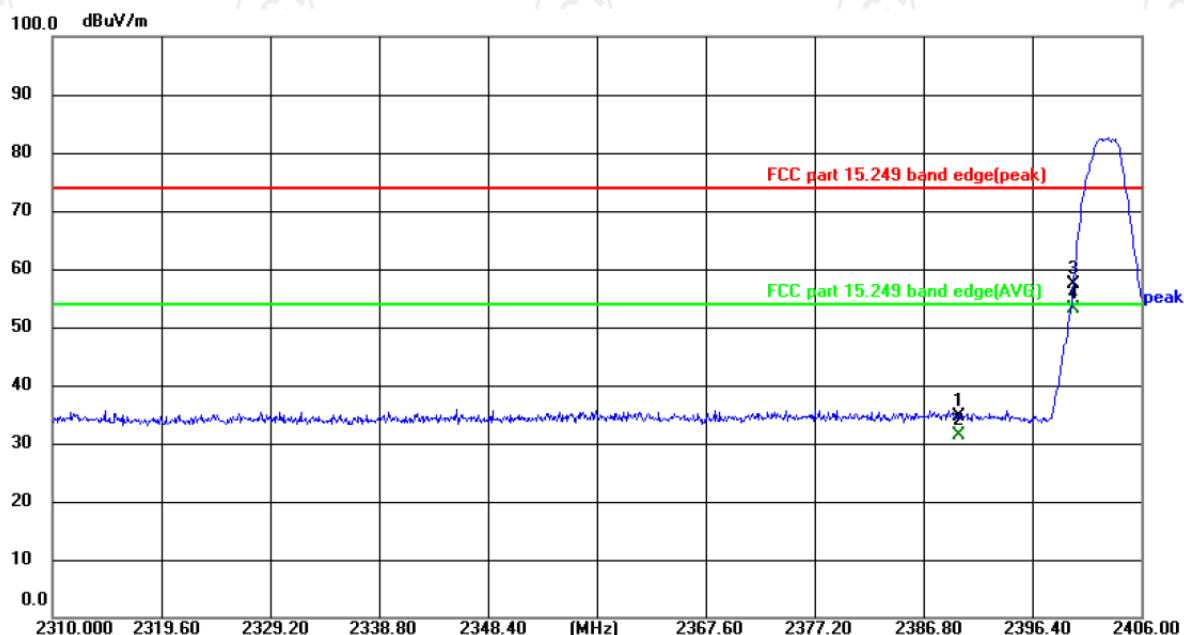
Note:

1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier
2. Margin (dB) = Emission Level (Peak) (dBμV/m)-Average limit (dBμV/m)
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.
5. Data of measurement shown “---”in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.
6. All the restriction bands are compliance with the limit of 15.209.

Band Edge Requirement

Lowest channel 2403:

Horizontal:



Site: #3 3m Anechoic Chamber

Polarization: **Horizontal**

Temperature: 22.8(°C)

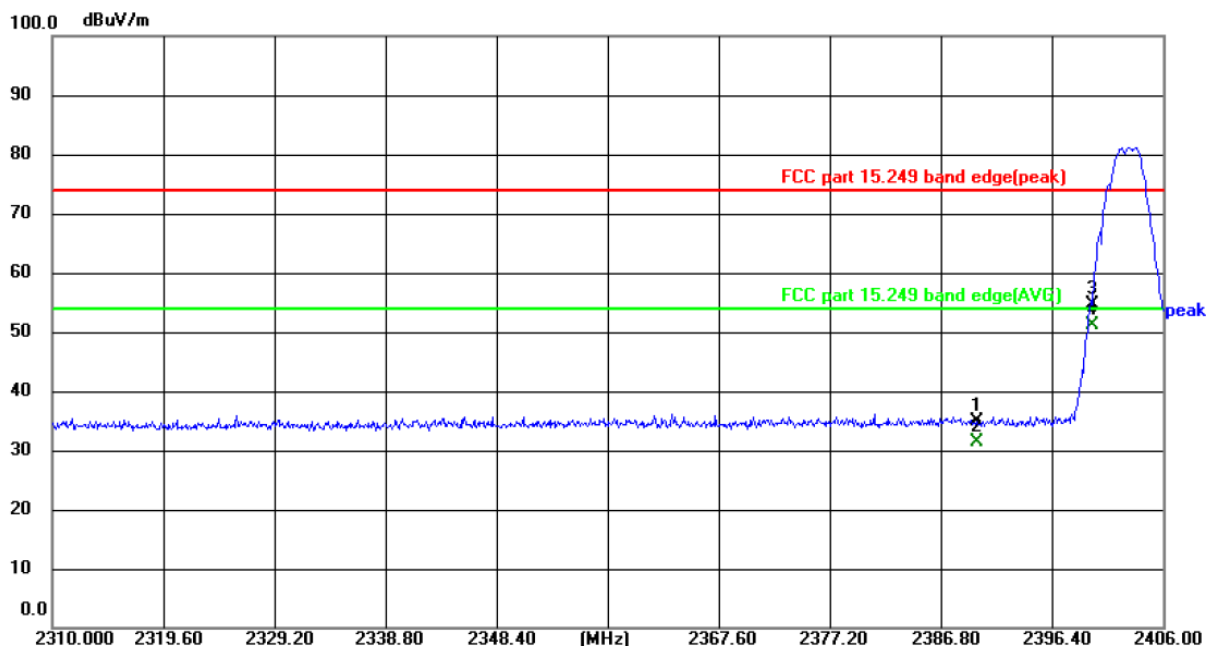
Humidity: 54 %

Limit: FCC part 15.249 band edge(peak)

Power: DC 3.7 V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	2390.000	50.48	-15.76	34.72	74.00	-39.28	peak	P	
2	2390.000	47.05	-15.76	31.29	54.00	-22.71	AVG	P	
3	2400.000	73.20	-15.72	57.48	74.00	-16.52	peak	P	
4 *	2400.000	68.76	-15.72	53.04	54.00	-0.96	AVG	P	

Vertical:



Site: #3 3m Anechoic Chamber

Polarization: **Vertical**

Temperature: 22.8(°C)

Humidity: 54 %

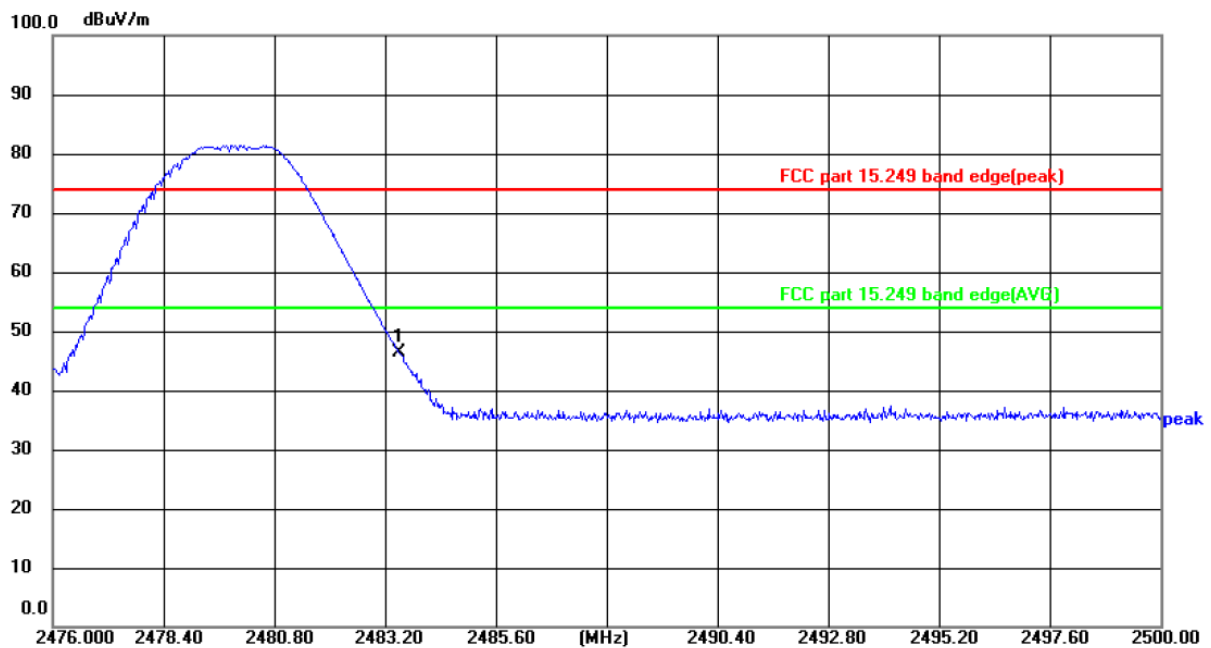
Limit: FCC part 15.249 band edge(peak)

Power:DC 3.7 V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	2390.000	50.58	-15.76	34.82	74.00	-39.18	peak	P	
2	2390.000	47.04	-15.76	31.28	54.00	-22.72	AVG	P	
3	2400.000	70.30	-15.72	54.58	74.00	-19.42	peak	P	
4 *	2400.000	66.81	-15.72	51.09	54.00	-2.91	AVG	P	

Highest channel 2480:

Horizontal:



Site: #3 3m Anechoic Chamber

Polarization: **Horizontal**

Temperature: 22.8(°C)

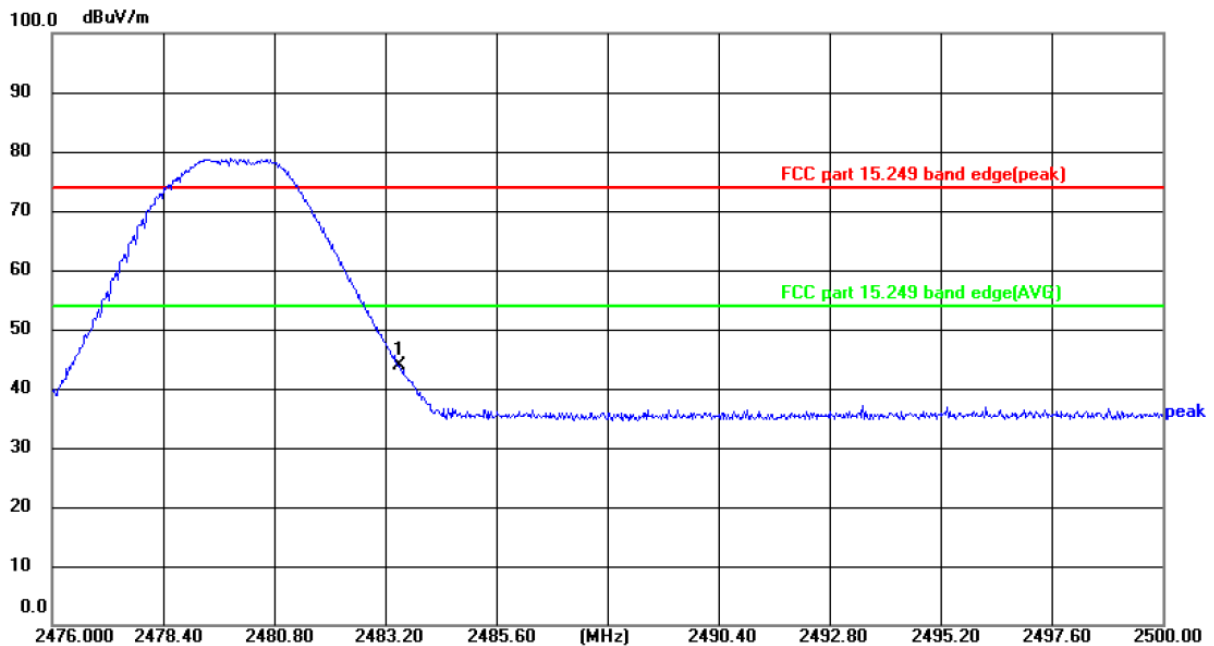
Humidity: 54 %

Limit: FCC part 15.249 band edge(peak)

Power: DC 3.7 V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 *	2483.500	61.76	-15.41	46.35	74.00	-27.65	peak	P	

Vertical:



Site: #3 3m Anechoic Chamber

Polarization: **Vertical**

Temperature: 22.8(°C)

Humidity: 54 %

Limit: FCC part 15.249 band edge(peak)


Power: DC 3.7 V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 *	2483.500	59.24	-15.41	43.83	74.00	-30.17	peak	P	

Note: Measurements were conducted in all channels (high, middle, low), and the worst case (Lowest channel) was submitted only.

5.4. 20dB Occupied Bandwidth

5.4.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.215(c)
Test Method:	ANSI C63.10: 2013
Limit:	N/A
	<ol style="list-style-type: none"> 1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Use the following spectrum analyzer settings for 20dB Bandwidth measurement. Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel; RBW\geq1% of the 20 dB bandwidth; VBW\geqRBW; Sweep = auto; Detector function = peak; Trace = max hold. 4. Measure and record the results in the test report.
Test setup:	 <p>The diagram illustrates the test setup. On the left is a green Spectrum Analyzer with a screen and two knobs. A cable connects it to a yellow rectangular box on the right labeled 'EUT'.</p>
Test Mode:	Transmitting mode with modulation
Test results:	PASS

5.4.2. Test Instruments

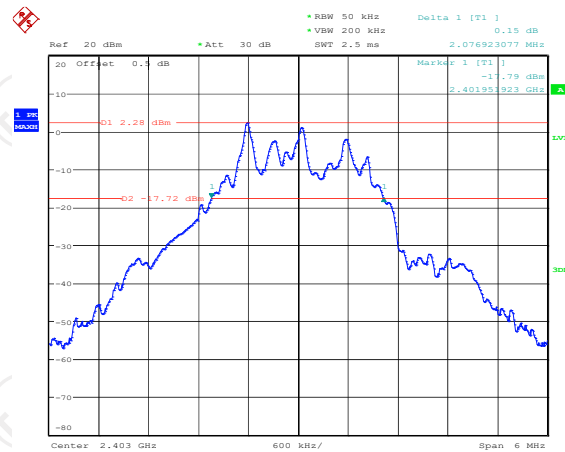
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSU	200054	Jul. 04, 2023

5.4.3. Test data

Test Channel	20dB Occupy Bandwidth (kHz)	Limit	Conclusion
Lowest	2076.92	---	PASS
Middle	2086.54	---	PASS
Highest	2086.54	---	PASS

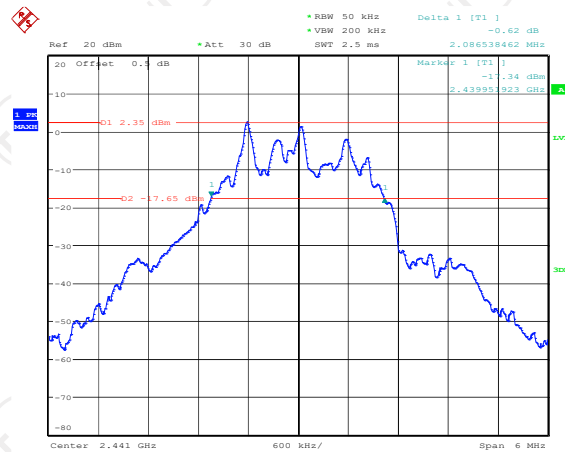
Test plots as follows:

Lowest channel



Date: 13.JAN.2023 16:16:54

Middle channel



Date: 13.JAN.2023 16:17:57

Highest channel



Date: 13.JAN.2023 16:18:53

Appendix A: Photographs of Test Setup

Refer to the test report No. TCT230109E031

Appendix B: Photographs of EUT

Refer to the test report No. TCT230109E031

*******END OF REPORT*******