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Report Template Version: V05 Report Template Revision Date: 2021-11-03

Test Report

Report No.: Applicant: Address of Applicant:	CQASZ20231001798E-01 ZhuoYe ChuangYi Co., Ltd. Room 602-1, Building 6, Shenzhen Bay Eco-Tech Park, Nanshan District, Shenzhen, China
Equipment Under Test (E	EUT):
EUT Name:	GravaStar 2.4GHz Receiver
Model No.:	GravaStar M2R
Test Model No.:	GravaStar M2R
Brand Name:	GravaStar
FCC ID:	2ASXF-M2R
Standards:	47 CFR Part 15, Subpart C
Date of Receipt:	2023-10-08
Date of Test:	2023-10-08 to 2023-10-31
Date of Issue:	2023-11-10
Test Result:	PASS*

*In the configuration tested, the EUT complied with the standards specified above

Tested By:	lewis zhou
	(Lewis Zhou)
Reviewed By: _	Timo Lei
	(Timo Lei)
Approved By: _	James
	(Jack Ai)



The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20231001798E-01	Rev.01	Initial report	2023-11-10



2 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203	ANSI C63.10 (2013)	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 (2013)	PASS
Field Strength of the Fundamental Signal	47 CFR Part 15, Subpart C Section 15.249 (a)	ANSI C63.10 (2013)	PASS
Spurious Emissions	47 CFR Part 15, Subpart C Section 15.249 (a)/15.209	ANSI C63.10 (2013)	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.249(a)/15.205	ANSI C63.10 (2013)	PASS
20dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.215 (c)	ANSI C63.10 (2013)	PASS



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4 General Information

4.1 Client Information

Applicant:	ZhuoYe ChuangYi Co., Ltd.
Address of Applicant:	Room 602-1, Building 6, Shenzhen Bay Eco-Tech Park, Nanshan District, Shenzhen, China
Manufacturer:	ZhuoYe ChuangYi Co., Ltd.
Address of Manufacturer:	Room 602-1, Building 6, Shenzhen Bay Eco-Tech Park, Nanshan District, Shenzhen, China
Factory:	Dongguan Siliten Electronics Co., Ltd
Address of Factory:	Sijia Yewu Industrial Estate, Shijie Town, Dongguan City, Guangdong, China

4.2 General Description of EUT

EUT Name:	GravaStar 2.4GHz Receiver		
Model No.:	GravaStar M2R		
Test Model No.:	GravaStar M2R		
Trade Mark:	GravaStar		
Software Version:	V0110		
Hardware Version:	V0.1		
Frequency Range:	2405MHz-2475MHz		
Modulation Type:	GFSK		
Number of Channels:	16		
Sample Type:	□ Mobile ⊠ Portable		
Test Software of EUT:	nRFgo Studio		
Antenna Type:	PCB antenna		
Antenna Gain:	-1.66dBi		
Power Supply:	Power supply computer		



Operation Frequency each of channel					
Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2405MHz	7	2433MHz	13	2463MHz
2	2408MHz	8	2441MHz	14	2466MHz
3	2414MHz	9	2445MHz	15	2471MHz
4	2419MHz	10	2447MHz	16	2475MHz
5	2422MHz	11	2453MHz	/	/
6	2426MHz	12	2459MHz	/	/

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The Lowest channel(CH1)	2405MHz
The Middle channel(CH8)	2441MHz
The Highest channel(CH16)	2475MHz



4.3 Test Environment and Mode

Operating Environment	Operating Environment:		
Radiated Emissions:			
Temperature:	27 °C		
Humidity:	59 % RH		
Atmospheric Pressure:	1009mbar		
Temperature:	26 °C		
Humidity:	59 % RH		
Atmospheric Pressure:	1009mbar		
Radio conducted item t	est (RF Conducted test room):		
Temperature:	25.3 °C		
Humidity:	55 % RH		
Atmospheric Pressure:	1009mbar		
Test mode:			
Transmitting mode:	Use test software (RF test) to set the lowest frequency, the middle frequency and the highest frequency keep transmitting of the EUT.		

4.4 Description of Support Units

The EUT has been tested with associated equipment below.

1) Support equipment

Description	Manufacturer	Model No.	Certification	Supplied by
Computer	/	1	/	CQA

Cable No.	Description	Manufacturer	Cable Type/Length	Supplied by	
1	/	/	/	/	



4.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate.

The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities.

The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the **Shenzhen Huaxia Testing Technology Co., Ltd.** quality system acc. to DIN EN ISO/IEC 17025.

Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Test	Range	Uncertainty	Notes
Radiated Emission	Below 1GHz	5.12dB	(1)
Radiated Emission	Above 1GHz	4.60dB	(1)
Conducted Disturbance	0.15~30MHz	3.34dB	(1)

Hereafter the best measurement capability for **CQA** laboratory is reported:

(1)This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



4.6 Test Location

All tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

4.7 Test Facility

• A2LA (Certificate No. 4742.01)

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

• FCC Registration No.: 522263

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.:522263

4.8 Deviation from Standards

None.

4.9 Abnormalities from Standard Conditions

None.

4.10 Other Information Requested by the Customer

None.



4.11 Equipment List

To st E su lis so ant	Manufastura		Instrument	Calibration	Calibration
Test Equipment	Manufacturer	Model No.	No.	Date	Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2023/09/08	2024/09/07
Spectrum analyzer	R&S	FSU26	CQA-038	2023/09/08	2024/09/07
		AFS4-00010300-18-10P-			
Preamplifier	MITEQ	4	CQA-035	2023/09/08	2024/09/07
		AMF-6D-02001800-29-			
Preamplifier	MITEQ	20P	CQA-036	2023/09/08	2024/09/07
Loop antenna	Schwarzbeck	FMZB1516	CQA-087	2021/09/16	2024/09/15
Bilog Antenna	R&S	HL562	CQA-011	2021/09/16	2024/09/15
Horn Antenna	R&S	HF906	CQA-012	2021/09/16	2024/09/15
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2021/09/16	2024/09/15
Coaxial Cable			0040		0004/00/07
(Above 1GHz)	CQA	N/A	C019	2023/09/08	2024/09/07
Coaxial Cable					
(Below 1GHz)	CQA	N/A	C020	2023/09/08	2024/09/07
Antenna Connector	CQA	RFC-01	CQA-080	2023/09/08	2024/09/07
RF					
cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2023/09/08	2024/09/07
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2023/09/08	2024/09/07
EMI Test Receiver	R&S	ESPI3	CQA-013	2023/09/08	2024/09/07
LISN	R&S	ENV216	CQA-003	2023/09/08	2024/09/07
Coaxial cable	CQA	N/A	CQA-C009	2023/09/08	2024/09/07

Note:

The temporary antenna connector is soldered on the pcb board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.



5 Test results and Measurement Data

5.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203
responsible party shall be us antenna that uses a unique	be designed to ensure that no antenna other than that furnished by the sed with the device. The use of a permanently attached antenna or of an coupling to the intentional radiator, the manufacturer may design the unit in be replaced by the user, but the use of a standard antenna jack or bited.
EUT Antenna:	
The antenna is PCB antenna	a.
The connection/connection attachment	type between the antenna to the EUT's antenna port is: permanently
This is either permanently at	ttachment or a unique coupling that satisfies the requirement.



5.2 Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.207						
Test Method:	ANSI C63.10: 2013						
Test Frequency Range:	150kHz to 30MHz						
Limit:		Limit (d	lBuV)				
	Frequency range (MHz)	Quasi-peak	Average				
	0.15-0.5	66 to 56*	56 to 46*				
	0.5-5	56	46				
	5-30	60	50				
	* Decreases with the logarithn	n of the frequency.					
Test Procedure:	 room. 2) The EUT was connected Impedance Stabilization N impedance. The power connected to a second LIS plane in the same way a multiple socket outlet strip single LISN provided the ra 3) The tabletop EUT was plat ground reference plane. A placed on the horizontal gr 4) The test was performed with the EUT shall be 0.4 m vertical ground reference reference plane. The LISN unit under test and bon mounted on top of the grout the closest points of the L and associated equipment 5) In order to find the maximum 	1) The mains terminal disturbance voltage test was conducted in a shielded					
Test Setup:	Shielding Room	AE B B B C C Mai Ground Reference Plane	Test Receiver				

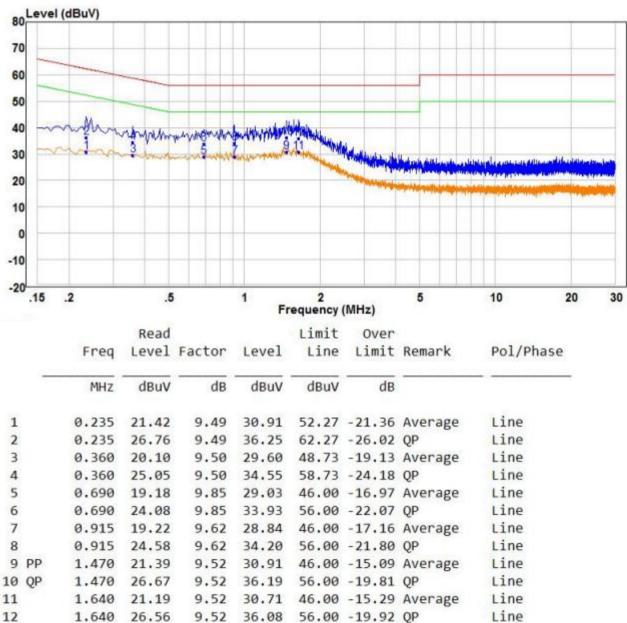


Report No.:CQASZ20231001798E-01

Test Mode:	Charge +Transmitting mode.
Final Test Mode:	Charge +Transmitting mode
Test Results:	Pass

Measurement Data:

Live line:



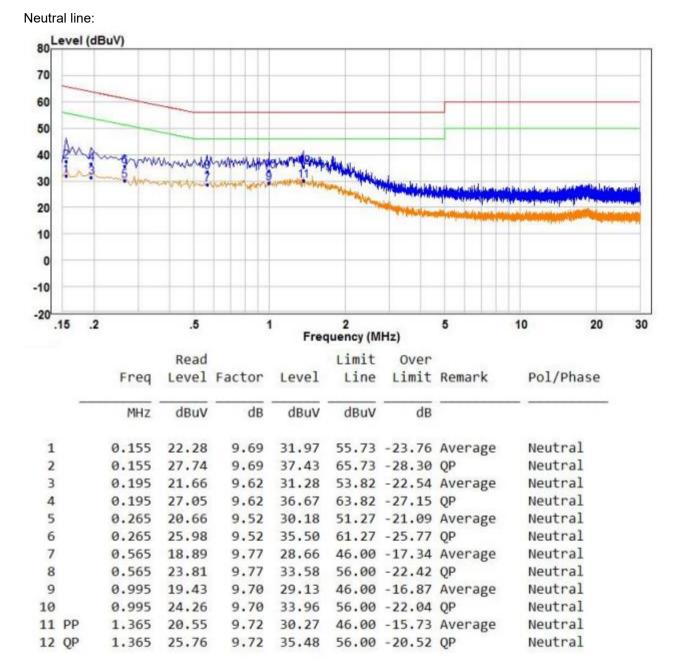
Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:

2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

3. If the Peak value under Average limit, the Average value is not recorded in the report.





Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:

2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

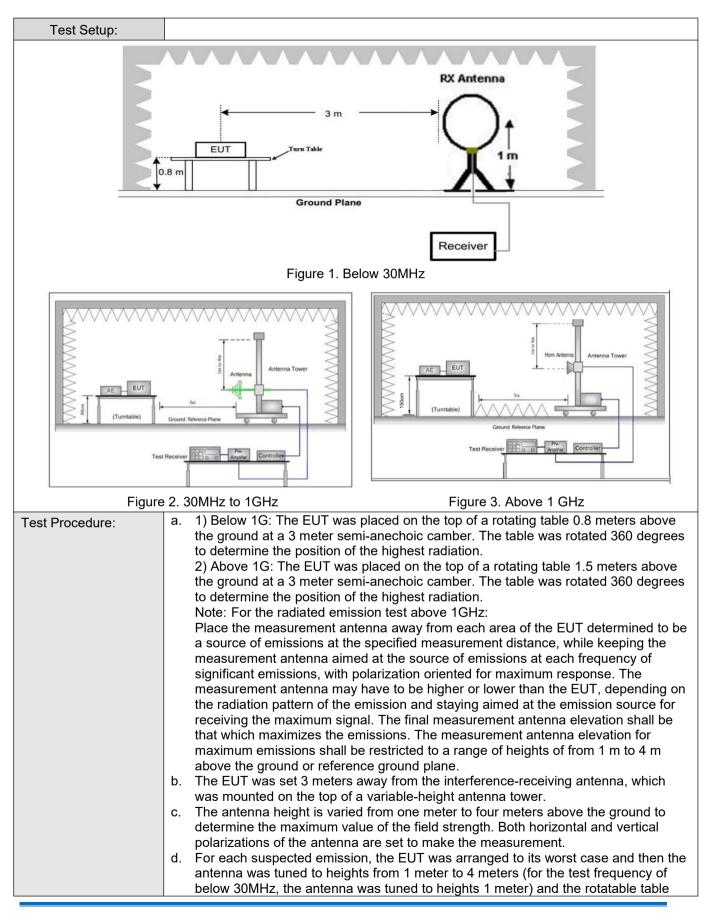
3. If the Peak value under Average limit, the Average value is not recorded in the report.



5.3 Radiated Emission

Test Requirement:	47 CFR Part 15C Section 15.249 and 15.209 and 15.205								
Test Method:	ANSI C63.10: 2013								
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)								
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark				
	0.009MHz-0.090MHz	Peak	10kHz	30KHz	Peak	1			
	0.009MHz-0.090MHz	Average	10kHz	30KHz	Average				
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30KHz	Quasi-peak				
	0.110MHz-0.490MHz	Peak	10kHz	30KHz	Peak				
	0.110MHz-0.490MHz	Average	10kHz	30KHz	Average				
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak				
	30MHz-1GHz	Quasi-peak	100 kHz	300KHz	Quasi-peak				
		Peak	1MHz	3MHz	Peak				
	Above 1GHz	Peak	1MHz	10Hz	Average				
	Note: For fundamental f value, RMS detect			5MHz, Peak d	letector is for	PK			
Limit: (Spurious Emissions	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark		Measurement distance (m)			
and band edge)	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300				
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30				
	1.705MHz-30MHz	30	-	-	30				
	30MHz-88MHz	100	40.0	Quasi-peak	3				
	88MHz-216MHz	150	43.5	Quasi-peak	3				
	216MHz-960MHz	200	46.0	Quasi-peak	3				
	960MHz-1GHz	500	54.0	Quasi-peak	3				
	Above 1GHz	500	54.0	Average	3				
	 Note: 1) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device. 2) 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. 								
Limit:	Frequency	Limit (dBu∖	//m @3m)	Rem	nark	1			
(Field strength of the		94.		Average		1			
fundamental signal)	2400MHz-2483.5MHz	114		Peak		1			







	 was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
	f. 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 retested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
	 g. Test the EUT in the lowest channel,the middle channel,the Highest channel h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode,And found the X axis positioning which it is worse case. i. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Transmitting mode, Charge + Transmitting mode.
Final Test Mode:	Pretest the EUT at Transmitting mode and Charge + Transmitting mode, found the Charge + Transmitting mode which it is worse case.
	For below 1GHz part, through pre-scan, the worst case is the lowest channel.
	Only the worst case is recorded in the report.
Test Results:	Pass

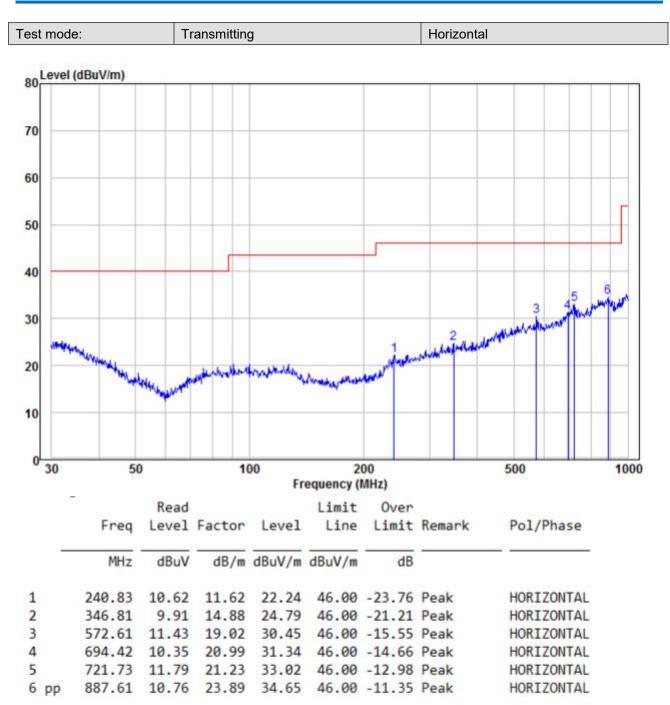


Measurement Data 30MHz~1GHz Test mode: Transmitting Vertical 80 Level (dBuV/m) 70 60 50 40 6 ad bla 30 all L 1 and an and the second second 2 3 20 10 0 200 30 50 100 500 1000 Frequency (MHz) Read Limit Over Freq Level Factor Level Line Limit Remark Pol/Phase MHz dBuV dB/m dBuV/m dBuV/m dB

		avar	007m	abarym	000171	00		
1	36.00	12.41	14.24	26.65	40.00	-13.35	Peak	VERTICAL
2	44.12	12.40	10.86	23.26	40.00	-16.74	Peak	VERTICAL
3	67.20	13.97	7.28	21.25	40.00	-18.75	Peak	VERTICAL
4	98.49	9.61	10.56	20.17	43.50	-23.33	Peak	VERTICAL
5	501.18	10.94	18.29	29.23	46.00	-16.77	Peak	VERTICAL
6 pp	845.09	10.29	24.08	34.37	46.00	-11.63	Peak	VERTICAL









Above 1GHz								
Test mode:		Transmitti	ng	Test chanr	nel:	Lowest		
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector	Ant. Pol.	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	H/V	
2390	59.81	-9.2	50.61	74	-23.39	Peak	Н	
2390	46.21	-9.2	37.01	54	-16.99	AVG	Н	
2400	44.20	-9.39	34.81	74	-39.19	Peak	Н	
2400	44.14	-9.39	34.75	54	-19.25	AVG	Н	
2405	100.53	-9.33	91.20	114	-22.80	peak	н	
2405	97.78	-9.33	88.45	94	-5.55	AVG	Н	
4810	57.02	-4.28	52.74	74	-21.26	peak	н	
4810	40.84	-4.28	36.56	54	-17.44	AVG	н	
7215	53.24	1.13	54.37	74	-19.63	peak	н	
7215	37.18	1.13	38.31	54	-15.69	AVG	Н	
2390	59.95	-9.2	50.75	74	-23.25	peak	V	
2390	45.61	-9.2	36.41	54	-17.59	AVG	V	
2400	60.50	-9.39	51.11	74	-22.89	peak	V	
2400	43.99	-9.39	34.60	54	-19.40	AVG	V	
2405	95.66	-9.33	86.33	114	-27.67	peak	V	
2405	90.82	-9.33	81.49	94	-12.51	AVG	V	
4810	56.70	-4.28	52.42	74	-21.58	peak	V	
4810	41.82	-4.28	37.54	54	-16.46	AVG	V	
7215	52.73	1.13	53.86	74	-20.14	peak	V	
7215	37.89	1.13	39.02	54	-14.98	AVG	V	



Test mode:		Transmitting		Test channel:		Middle	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector	Ant. Pol.
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	H/V
2441	100.27	-9.37	90.90	114	-23.10	peak	н
2441	98.40	-9.37	89.03	94	-4.97	AVG	н
4882	57.22	-4.14	53.08	74	-20.92	peak	Н
4882	42.04	-4.14	37.90	54	-16.10	AVG	н
7323	51.33	0.56	51.89	74	-22.11	peak	н
7323	37.70	0.56	38.26	54	-15.74	AVG	н
2441	95.65	-9.36	86.29	114	-27.71	peak	V
2441	94.33	-9.36	84.97	94	-9.03	AVG	V
4882	57.47	-4.14	53.33	74	-20.67	peak	V
4882	42.96	-4.14	38.82	54	-15.18	AVG	V
7323	52.24	0.56	52.80	74	-21.20	peak	V
7323	37.37	0.56	37.93	54	-16.07	AVG	V



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Test mode:		Transmitting		Test channel:		Highest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector	Ant. Pol.
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	H/V
2475	100.14	-9.23	90.91	114	-23.09	peak	н
2475	96.40	-9.23	87.17	94	-6.83	AVG	н
2483.5	60.61	-9.29	51.32	74	-22.68	Peak	н
2483.5	43.08	-9.29	33.79	54	-20.21	AVG	н
4950	56.06	-4.03	52.03	74	-21.97	peak	н
4950	40.80	-4.03	36.77	54	-17.23	AVG	н
7425	53.09	1.68	54.77	74	-19.23	peak	н
7425	37.36	1.68	39.04	54	-14.96	AVG	н
2475	96.47	-9.23	87.24	114	-26.76	peak	V
2475	94.78	-9.23	85.55	94	-8.45	AVG	V
2483.5	62.42	-9.29	53.13	74	-20.87	peak	V
2483.5	44.64	-9.29	35.35	54	-18.65	AVG	V
4950	56.99	-4.03	52.96	74	-21.04	peak	V
4950	42.01	-4.03	37.98	54	-16.02	AVG	V
7425	51.96	1.68	53.64	74	-20.36	peak	V
7425	36.24	1.68	37.92	54	-16.08	AVG	V

Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

2) Scan from 9kHz to 25GHz, The disturbance above 10GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.



5.4 20dB Bandwidth

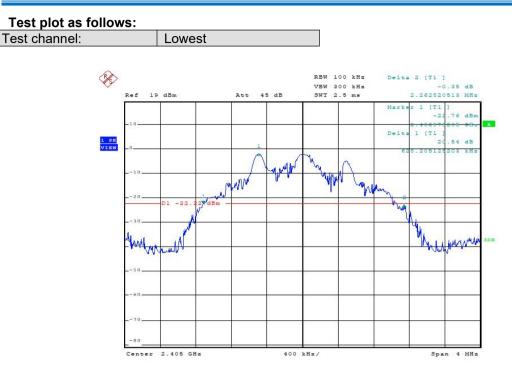
Test Requirement:	47 CFR Part 15C Section 15.215	
Test Method:	ANSI C63.10:2013	
Test Setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane	
Test Mode:	Transmitting with GFSK modulation.	
Limit:	N/A	
Test Results:	Pass	

Measurement Data

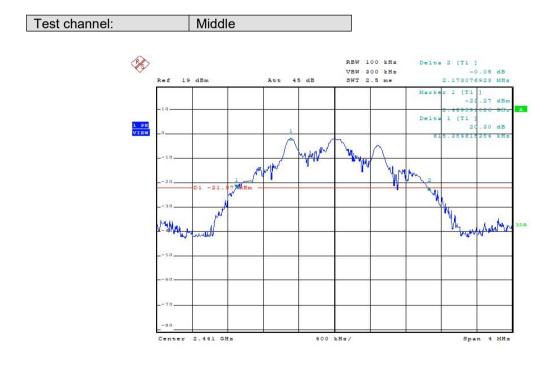
Test channel	20dB bandwidth (MHz)	Results
Lowest	1.92	Pass
Middle	1.93	Pass
Highest	1.92	Pass



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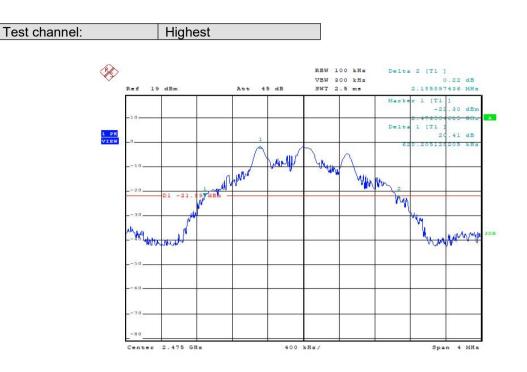
Date: 30.0CT.2023 14:22:19



Date: 30.0CT.2023 14:25:25



Report No.:CQASZ20231001798E-01



Date: 30.0CT.2023 14:20:36





6 Photographs

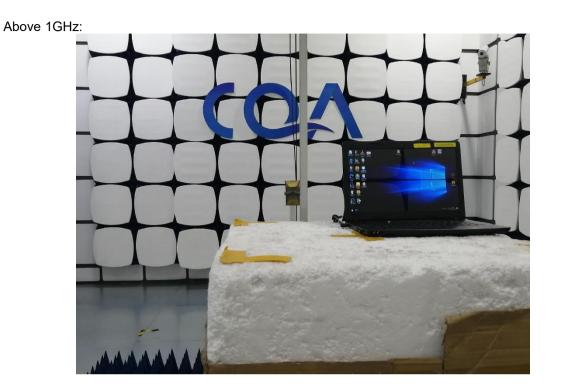
6.1 Radiated Emission Test Setup

9kHz~30MHz









6.2 Conducted Emission Test Setup





6.3 EUT Constructional Details

