

FCC RADIO TEST REPORT

Applicant.....: SHENZHEN HENGSHANG ELECTRONIC CO., LTD

Address...... : Building 2, Zone B, Zhanmi Ling Industrial Zone, Xinmu Community, Pinghu

Street, Longgang District, Shenzhen City, Guangdong Province

Manufacturer.....: SHENZHEN HENGSHANG ELECTRONIC CO., LTD

Address...... : Building 2, Zone B, Zhanmi Ling Industrial Zone, Xinmu Community, Pinghu

Street, Longgang District, Shenzhen City, Guangdong Province

Factory.....: SHENZHEN HENGSHANG ELECTRONIC CO., LTD

Address...... : Building 2, Zone B, Zhanmi Ling Industrial Zone, Xinmu Community, Pinghu

Street, Longgang District, Shenzhen City, Guangdong Province

Product Name..... 2.4GHz Receiver

Brand Name.....:

RECCAZR

. RECCAZR

Model No. : DM07, HS8100, WC500(For model difference refer to section 2.)

FCC ID...... : 2BDIRHS-R8100-DM07

Measurement Standard.....: 47 CFR FCC Part 15, Subpart C (Section 15.249)

Receipt Date of Samples.... : October 30, 2023

Date of Tested.....: October 30, 2023 to November 24, 2023

Date of Report.....: December 12, 2023

This report shows that above equipment is technically compliant with the requirements of the standards above. All test results in this report apply only to the tested sample(s). Without prior written approval of Dongguan Nore

Testing Center Co., Ltd, this report shall not be reproduced except in full.

Prepared by

Rose Hu / Project Engineer

Signatory





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Revision History

Report Number	Description	Issued Date
NTC2310404FV00	Initial Issue	2023-12-12





1. Summary of Test Result

FCC Rules	Description of Test	Result	Remarks
§15.207 (a)	AC Power Conducted Emission	PASS	
§15.249(a)/ 15.209	Radiated Emissions	PASS	
§15.249(d)/ 15.205	Band Edge	PASS	
§15.215(c)	20dB Bandwidth	PASS	
§15.203	Antenna Requirement	PASS	





2. General Description of EUT

Product Information	
Product name:	2.4GHz Receiver
Main Model Name:	DM07
Additional Model Name:	HS8100, WC500
Model Difference:	Model DM07 is the model of 2.4G Receiver;
	Model HS8100, WC500 are the package model with wireless mouse, wireless
	keyboard and receiver.
S/N:	2310-5143
Brand Name:	RECCAZR
	, RECCAZR
Hardware version:	Not stated
Software version:	Not stated
Rating:	DC 5V
Typical arrangement:	Table-top
I/O Port:	Refer to user manual
Accessories Information	
Adapter:	N/A
Cable:	N/A
Other:	N/A
Additional Information	
Note:	N/A
Remark:	All the information above are provided by the manufacturer. More detailed feature of the EUT please refers to the user manual.
	1





Technical Specification	(2.4G Function)
Frequency Range:	2403.65-2479.65MHz
Modulation Type:	GFSK
Number of Channel:	16 (refer to following channel list for details)
Antenna Type:	PCB Antenna
Antenna Gain:	1.92 dBi (Declared by manufacturer)





Channel list						
Channel	Frequency (MHz)	Channel	Frequency (MHz)			
1	2403.65	9	2414.65			
2	2426.65	10	2436.65			
3	2441.65	11	2459.65			
4	2463.65	12	2473.65			
5	2407.65	13	2419.65			
6	2422.65	14	2439.65			
7	2445.65	15	2453.65			
8	2466.65	16	2479.65			

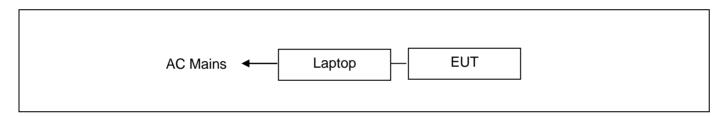


3. Test Channels and Modes Detail

Mode Channel		Mode		Frequency (MHz)	Modulation
1	TX	Low	1	2403.65	GFSK
2	TX	Mid	3	2441.65	GFSK
3	TX	High	16	2479.65	GFSK
4.	Normal Mode				

Note: TX mode means that the EUT was programmed to be in continuously transmitting mode.

4. Configuration of EUT



5. Modification of EUT

No modifications are made to the EUT during all test items.





6. Description of Support Device

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.

No.	Equipment	Brand	M/N	S/N	Cable Specification	Remarks
1.	Laptop	DELL	VOSTR03400	H3K2XA01	I/P: AC 100-240V	
2.	Adapter	DELL	HA45NM140		50-60Hz, 1.3A O/P: DC 19.5V 2.31A 45W AC Line: 1.13m unshielded DC Line: 1.15m unshielded with a core	

No.	Test Software	Modulation	Power Setting



7. Test Facility and Location

Test Site	:	Dongguan Nore Testing Center Co., Ltd. (Dongguan NTC Co., Ltd.)			
Accreditations and	:	The Laboratory has been assessed and proved to be in compliance with			
Authorizations		CNAS/CL01			
		Listed by CNAS, August 13, 2018			
		e Certificate Registration Number is L5795.			
		The Certificate is valid until August 13, 2024			
		The Laboratory has been assessed and proved to be in compliance with			
		ISO17025			
		Listed by A2LA, November 01, 2017			
		e Certificate Registration Number is 4429.01			
		Listed by FCC, November 06, 2017			
		Test Firm Registration Number: 907417			
		Listed by Industry Canada, June 08, 2017			
		The Certificate Registration Number. Is 46405-9743A			
Test Site Location	:	Building D, Gaosheng Science and Technology Park, Hongtu Road, Nancheng			
		District, Dongguan City, Guangdong Province, China			

8. Applicable Standards and References

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

Test Standards:

47 CFR Part 15, Subpart C, 15.249 ANSI C63.10-2013

References Test Guidance:

N/A



9. Deviations and Abnormalities from Standard Conditions

No additions, deviations and exclusions from the standard.

10. Test Conditions

No.	Test Item	Test Mode	Test Voltage	Tested by	Remarks
1.	AC Power Conducted Emission	4	AC 120V 60Hz	Sean	See note 1
2.	Radiated Emissions	1-4	AC 120V 60Hz	Sean	See note 1
3.	Band Edge	1-3	AC 120V 60Hz	Sean	See note 1
4.	20dB Bandwidth	1-3	AC 120V 60Hz	Sean	See note 1
5.	Antenna Requirement				

Note:

- 1. The testing climatic conditions for temperature, humidity, and atmospheric pressure are within: $15\sim35^{\circ}$ C, $30\sim70\%$, $86\sim106$ kPa
- 2. Only the worst case was recorded in the report. For test voltage AC 120V60Hz was come from laptop.





11. Measurement Uncertainty

No.	Test Item	Frequency	Uncertainty	Remarks
1.	Conducted Emission	150KHz ~ 30MHz	±2.52 dB	
		9kHz ~ 30MHz	±5.66 dB	
2.	Radiated Emission Test	30MHz ~ 1GHz	±5.66 dB	
		1GHz ~ 18GHz	±5.19 dB	
		18GHz ~ 40GHz	±5.19 dB	
3.	RF Conducted Test	10Hz ~ 40GHz	±1.18 dB	
4.	Occupied Channel Bandwidth		±0.72%	

Note:

- 1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2. The measurement uncertainly levels above are estimated and calculated according to CISPR 16-4-2.
- 3. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.





12. Sample Calculations

Conducted Emission									
Freq. (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector			
0.1580	40.12	9.98	50.10	65.57	-15.47	QP			

Where,

Freq. = Emission frequency in MHz

Reading Level = Spectrum Analyzer/Receiver Reading

Corrector Factor = Insertion loss of LISN + Cable Loss + RF Switching Unit attenuation

Measurement = Reading + Corrector Factor

Limit = Limit stated in standard

Margin = Measurement - Limit

Detector = Reading for Quasi-Peak / Average / Peak

Radiated Spurious Emissions and Restricted Bands									
Freq. (MHz)	Reading Level (dBuV)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector				
240.4900	28.51	-7.61	20.90	46.00	-25.10	QP			

Where,

Freq. = Emission frequency in MHz

Reading Level = Spectrum Analyzer/Receiver Reading

Corrector Factor = Antenna Factor + Cable Loss - Pre-amplifier

Measurement = Reading + Corrector Factor

Limit = Limit stated in standard

Over = Margin, which calculated by Measurement - Limit

Detector = Reading for Quasi-Peak / Average / Peak

Note: For all conducted test items, the spectrum analyzer offset or transducer is derived from RF cable loss and attenuator factor. The offset or transducer is equal to the RF cable loss plus attenuator factor.



13. Test Items and Results

13.1 Conducted Emissions Measurement

LIMITS

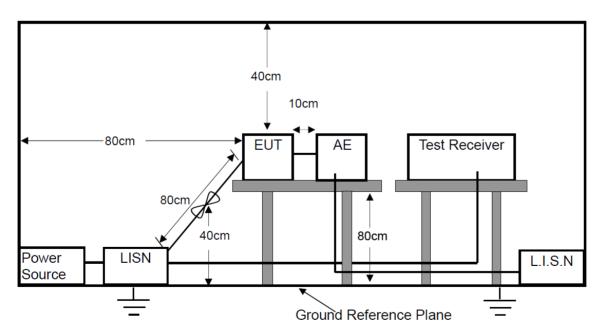
According to the requirements of FCC PART 15.207, the limits are as follows:

Frequency (MHz)	Quasi-peak	Average
0.15 to 0.5	66 to 56	56 to 46
0.5 to 5	56	46
5 to 30	60	50

Note: 1. If the limits for the average detector are met when using the quasi-peak detector, then the limits for the measurements with the average detector are considered to be met.

- 2. The lower limit shall apply at the transition frequencies.
- 3. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5MHz.

BLOCK DIAGRAM OF TEST SETUP







TEST PROCEDURES

- a. The EUT was placed on a wooden table 0.8m height from the metal ground plan and 0.4m from the conducting wall of the shielding room and it was kept at 0.8m from any other grounded conducting surface.
- b. All I/O cables and support devices were positioned as per ANSI C63.10.
- c. Connect mains power port of the EUT to a line impedance stabilization network (LISN).
- d. Connect all support devices to the other LISN and AAN, if needed.
- e. Scan the frequency range from 150KHz to 30MHz at both sides of AC line for maximum conducted interference checking and record the test data.

TEST RESULTS

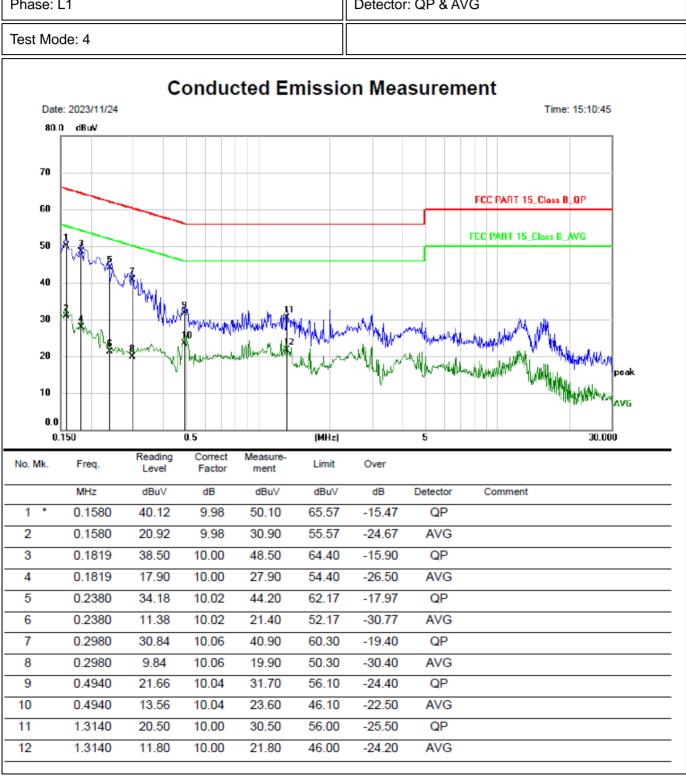
PASS

Please refer to the following pages of the worst case.





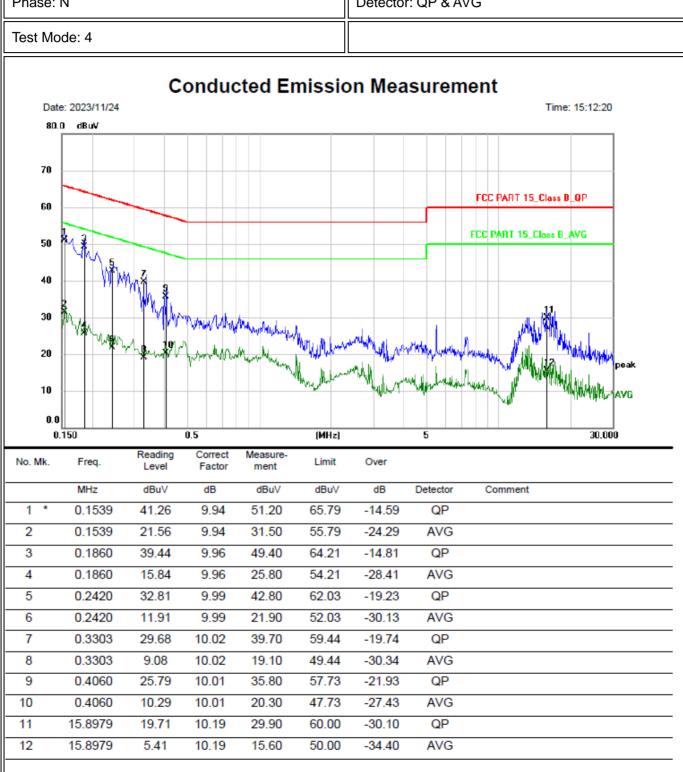
M/N: DM07	Testing Voltage: AC 120V / 60Hz		
Phase: L1	Detector: QP & AVG		
Test Mode: 4			







M/N: DM07	Testing Voltage: AC 120V / 60Hz		
Phase: N	Detector: QP & AVG		
Test Mode: 4			







13.2 Radiated Spurious Emissions and Restricted Bands Measurement

LIMITS

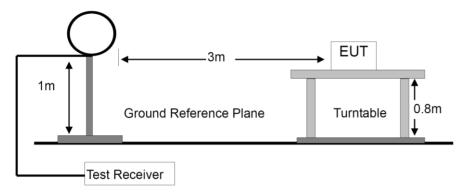
Frequency range	Distance Meters	Field Strengths Limit (15.209)				
MHz		μV/m				
0.009 ~ 0.490	300	2400/	F(kHz)			
0.490 ~ 1.705	30	24000/	F(kHz)			
1.705 ~ 30	30	3	0			
30 ~ 88	3	10	00			
88 ~ 216	3	15	50			
216 ~ 960	3	20	00			
Above 960	3	500				
Frequency range	Distance Meters	Field Strengths	s Limit (15.249)			
MHz		mV/m (Field strength of fundamental)	μV/m (Field strength of Harmonics)			
902 ~ 928	3	50	500			
2400 ~ 2483.5	3	50	500			
5725 ~ 5875	3	50	500			
24000 ~ 2425000	3	250	2500			

- Remark: (1) Emission level (dB) μ V = 20 log Emission level μ V/m
 - (2) The smaller limit shall apply at the cross point between two frequency bands.
 - (3) As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.
 - (4) The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.
 - (5) §15.249(d) specifies that emissions which fall in the restricted bands, as defined in §15.205 comply with radiated emission limits specified in §15.209.

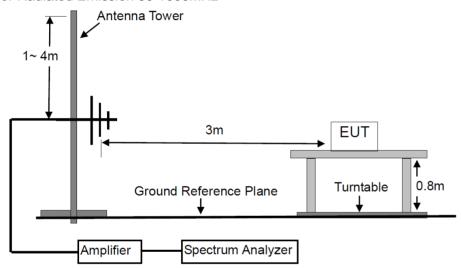


BLOCK DIAGRAM OF TEST SETUP

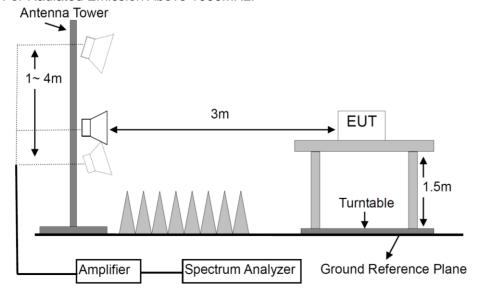
For Radiated Emission below 30MHz



For Radiated Emission 30-1000MHz



For Radiated Emission Above 1000MHz.





TEST PROCEDURES

- a. Below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi- anechoic chamber room.
- b. For the radiated emission test above 1GHz:
 - The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter full anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- c. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. 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.
- e. 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. The test-receiver system was set to peak detect function and specified bandwidth with maximum hold mode.
- f. A Quasi-peak measurement was then made for that frequency point for below 1GHz test. PK and AV for above 1GHz emission test.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Band (MHz)	Detector	Resolution Bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	3 MHz
Above 1000	Average	1 MHz	10 Hz





TEST RESULTS

PASS

Please refer to the following pages.





M/N: DM07	Testing Voltage: AC 120V 60Hz		
Polarization: Horizontal	Detector: QP		
Test Mode: 3	Distance: 3m		

Radiated Emission Measurement Date: 2023/11/14 Time: 22:29:19 80.0 dBuV/m 70 60 FCC_Part 15C_3m Margin -6 dB 50 40 30 20 10 0.0 224.000 30.0000 127.000 321.000 418.000 515.000 612.000 709.000 806.000 1000.000 MHz

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment	
1		215.2700	33.51	-7.51	26.00	43.50	-17.50	QP		
2	*	325.8500	45.48	-4.78	40.70	46.00	-5.30	QP		
3		484.9300	31.28	-1.98	29.30	46.00	-16.70	QP		
4		725.4900	25.16	2.64	27.80	46.00	-18.20	QP		
5		803.0900	28.18	4.02	32.20	46.00	-13.80	QP		
6		908.8200	33.19	6.21	39.40	46.00	-6.60	QP		

Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.





M/N: DM07	Testing Voltage: AC 120V 60Hz		
Polarization: Vertical	Detector: QP		
Test Mode: 3	Distance: 3m		

Radiated Emission Measurement Date: 2023/11/14 Time: 22:35:23 80.0 dBuV/m 70 60 FCC_Part 15C_3m Margin -6 dB 50 40 30 20 10 30.0000 127.000 224.000 321.000 418.000 515.000 612.000 709.000 806.000 1000.000 MHz

No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBu∀	dB/m	dBuV/m	dBu∀/m	dB	Detector	Comment	
1		240.4900	28.51	-7.61	20.90	46.00	-25.10	QP		
- 2	*	329.7300	39.16	-5.66	33.50	46.00	-12.50	QP		
- 3	1	464.5600	30.01	-3.31	26.70	46.00	-19.30	QP		
- 4		499.4800	28.48	-2.78	25.70	46.00	-20.30	QP		
5	i	560.5900	26.87	-1.47	25.40	46.00	-20.60	QP		
- 6	;	726.4600	26.75	2.65	29.40	46.00	-16.60	QP		

Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.





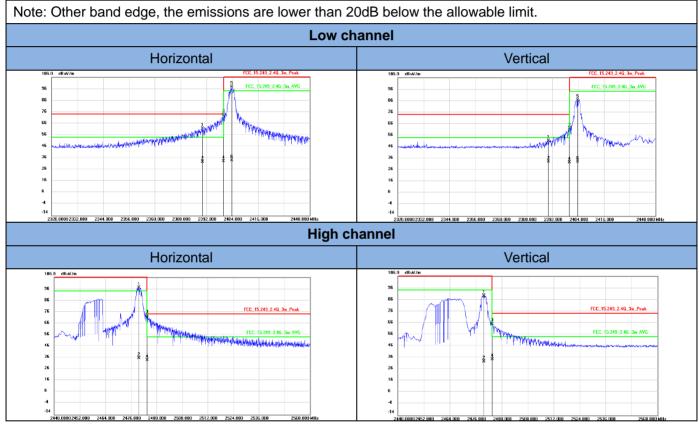
Modulation:	Test Re	Test Result: PASS				Test frequency range: 1-25GHz				
Freq.	Ant. Pol.	Read Level(d		Factor	Emissio (dBu\		Limit 3m (dBuV/m)		Margin (dB)	
(MHz)	(H/V)	PK	AV	(dB/m)	PK	AV	PK	AV	PK	AV
			Ope	ration Mo	de: TX Mo	de (Low)				
2403.650	V	86.64	42.96	0.13	86.77	43.09	114.00	94.00	-27.23	-50.91
4807.300	V	46.06	31.56	6.32	52.38	37.88	74.00	54.00	-21.62	-16.12
7210.950	V	51.80	31.69	10.44	62.24	42.13	74.00	54.00	-11.76	-11.87
2403.650	Н	97.50	43.72	0.13	97.63	43.85	114.00	94.00	-16.37	-50.15
4807.300	Н	45.19	31.60	6.32	51.51	37.92	74.00	54.00	-22.49	-16.08
7210.950	Н	49.03	31.64	10.44	59.47	42.08	74.00	54.00	-14.53	-11.92
			Ope	ration Mo	de: TX Mo	de (Mid)				
2441.650	V	88.41	43.65	0.24	88.65	43.89	114.00	94.00	-25.35	-50.11
4883.300	V	45.53	31.37	6.61	52.14	37.98	74.00	54.00	-21.86	-16.02
7324.950	V	49.83	31.80	10.54	60.37	42.34	74.00	54.00	-13.63	-11.66
2441.650	Н	97.51	45.27	0.24	97.75	45.51	114.00	94.00	-16.25	-48.49
4883.300	Н	45.36	31.42	6.61	51.97	38.03	74.00	54.00	-22.03	-15.97
7324.950	Н	48.35	31.81	10.54	58.89	42.35	74.00	54.00	-15.11	-11.65
			Oper	ation Mod	de: TX Mo	de (High)				
2479.650	V	88.92	42.22	0.34	89.26	42.56	114.00	94.00	-24.74	-51.44
4959.300	V	42.94	34.11	6.89	49.83	41.00	74.00	54.00	-24.17	-13.00
7438.950	V	41.11	30.96	10.60	51.71	41.56	74.00	54.00	-22.29	-12.44
2479.650	Н	96.92	45.37	0.34	97.26	45.71	114.00	94.00	-16.74	-48.29
4959.300	I	44.61	31.10	6.89	51.50	37.99	74.00	54.00	-22.50	-16.01
7438.950	Н	46.47	31.02	10.60	57.07	41.62	74.00	54.00	-16.93	-12.38

Remark: 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.





Band edge										
2390.000	Η	61.38	32.55	0.09	61.47	32.64	74.00	54.00	-12.53	-21.36
2390.000	V	51.31	33.14	0.09	51.40	33.23	74.00	54.00	-22.60	-20.77
2399.900	Н	73.44	33.06	0.13	73.57	33.19	74.00	54.00	-0.43	-20.81
2399.900	V	62.06	32.47	0.13	62.19	32.60	74.00	54.00	-11.81	-21.40
2483.500	Н	72.64	33.61	0.34	72.98	33.95	74.00	54.00	-1.02	-20.05
2483.500	V	64.81	34.14	0.34	65.15	34.48	74.00	54.00	-8.85	-19.52







13.3 20dB Bandwidth Measurement

LIMITS

There is no limit.

BLOCK DIAGRAM OF TEST SETUP

EUT	Attenuator	Spectrum Analyzer
-----	------------	-------------------

TEST PROCEDURES

The 20dB bandwidth of the emission was contained within the frequency band designated which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over excepted variations in temperature and supply voltage were considered, FCC Rule 15.215(c):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RBW was chosen so that the display was a result of the hopping channel modulation. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. Use the spectrum 20dB down delta function to measure the bandwidth.

TEST RESULTS

PASS

Please refer to the following table.











13.4 Antenna Requirement

STANDARD APPLICABLE

According to of FCC part 15C section 15.203:

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.

ANTENNA CONNECTED CONSTRUCTION

The antenna is PCB antenna that no antenna other than furnished by the responsible party shall be used with the device, and the best case gain of the antenna is 1.92 dBi, Therefore, the antenna is considered to meet the requirement.





14. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI7	100837	Mar. 13, 2023	1 Year
2.	Antenna	Schwarzbeck	VULB9162	9162-010	Mar. 23, 2022	2 Year
3.	Spectrum Analyzer	Rohde & Schwarz	FSU26	200409/026	Mar. 13, 2023	1 Year
4.	Spectrum Analyzer	Keysight	N9020A	MY54200831	Mar. 13, 2023	1 Year
5.	Spectrum Analyzer	Rohde & Schwarz	FSV40	101094	Mar. 13, 2023	1 Year
6.	Horn Antenna	Schwarzbeck	BBHA9170	9170-172	Mar. 23, 2022	2 Year
7.	Power Sensor	DARE	RPR3006W	15l00041SNO 64	Mar. 13, 2023	1 Year
8.	Horn Antenna	COM-Power	AH-118	071078	Mar. 23, 2022	2 Year
9.	Pre-Amplifier	HP	HP 8449B	3008A00964	Mar. 13, 2023	1 Year
10.	Pre-Amplifier	HP	HP 8447D	1145A00203	Mar. 13, 2023	1 Year
11.	Loop Antenna	Schwarzbeck	FMZB 1513	1513-272	Mar. 23, 2022	2 Year
12.	Test Receiver	Rohde & Schwarz	ESCI	101152	Mar. 13, 2023	1 Year
13.	L.I.S.N	Rohde & Schwarz	ENV 216	101317	Mar. 13, 2023	1 Year
14.	RF Switching Unit	Compliance Direction Systems Inc.	RSU-M2	38311	Mar.13, 2023	1 Year
15.	Temporary antenna connector	TESCOM	SS402	N/A	N/A	N/A
16.	Test Software	EZ	EZ_EMC NTC-3A1.1	N/A	N/A	N/A

Note: For photographs of EUT and measurement, please refer to appendix in separate documents.