Certificate Number: 5055.02

MPE REPORT

Report No.: SRTC2021-9004(F)-21092301(I)

Product Name: BT/Wi-Fi Module

Product Model: MW503-1

Applicant: Qingdao Hisense Communication Co., Ltd.

Manufacturer: Qingdao Hisense Communication Co., Ltd.

Specification: FCC Part §2.1091, §2.1093, §1.1307(b), §1.1310 (2020)

FCC ID: SARMW5031

The State Radio_monitoring_center Testing Center (SRTC)

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CONTENTS

1 GENERAL INFORMATION

1.1 Notes of the test report

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1.2 Information about the testing laboratory

Company:	The State Radio_monitoring_center Testing Center (SRTC)
Address:	15th Building, No.30 Shixing Street, Shijingshan District, P.R.China
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1.3 Applicant's details

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Country or Region:	China
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1.4 Manufacturer's details

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City:	Qingdao
Country or Region:	China
Contacted person:	Wang Haining
Tel:	0532-55756937
Fax:	---
Email:	wanghaining@hisense.com

2 DESCRIPTION OF THE DEVICE UNDER TEST

2.1 Final Equipment Build Status

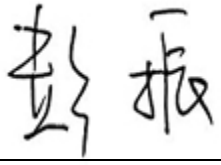
Frequency Bands	BT/BLE: 2400MHz – 2483.5MHz WIFI2.4GHz: 2400MHz – 2483.5MHz WIFI5GHz UNII-1: 5150MHz – 5250MHz WIFI5GHz UNII-2A: 5250MHz – 5350MHz WIFI5GHz UNII-2C: 5470MHz – 5725MHz WIFI5GHz UNII-3: 5725MHz – 5850MHz
Mode	BT:GFSK/π/4DQPSK/8DPSK BLE: GFSK WIFI2.4GHz: 802.11b/g/n HT20/HT40 WIFI5GHz: 802.11a/n HT20/n HT40 802.11ac VHT20/VHT40/VHT80
Power Supply	DC Adapter
Hardware Version	V1.00
Software Version	---
IMEI or Sample	#1

3 REFERENCE SPECIFICATION

Specification	Version	Title
2.1091	2020	Radio frequency radiation exposure evaluation: mobile devices.
2.1093	2020	Radio frequency radiation exposure evaluation: portable devices.
1.1307(b)	2020	Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared.
1.1310	2020	Radio frequency radiation exposure limits.
KDB447498	October 23, 2015	RF exposure procedures and equipment authorization policies for mobile and portable devices

4 RESULT SUMMARY

No.	Test case	FCC reference
1	MPE Calculation	FCC Part §2.1091, FCC Part §2.1093, FCC Part §1.1307(b) FCC Part §1.1310 KDB 447498

This Test Report Is Issued by: Mr. Peng Zhen 	Checked by: Mr. Li Bin 
Tested by: Mr. Du Wei 	Issued date: 2021.10.15

5 TEST RESULTS

5.1 Average Power Output Test Result

BT

Modulation type	Conducted Average Power(dBm)			Tune-up(dBm)
	2402MHz	2441MHz	2480MHz	
GFSK	7.19	6.89	7.47	7.5
π/4DQPSK	1.20	3.16	2.88	3.5
8DPSK	4.07	3.56	3.48	4.5

BLE

Modulation type	Conducted Average Power(dBm)			Tune-up(dBm)
	2402MHz	2440MHz	2480MHz	
GFSK (LE 1Mbps)	7.80	8.06	8.48	8.5
GFSK (LE 2Mbps)	3.39	4.96	5.58	6.0

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WiFi2.4GHz

Mode	Freq(MHz)	Average power output (dBm)	Tune-up(dBm)
802.11b	2412MHz	14.84	15.5
	2437MHz	15.13	
	2462MHz	15.40	
802.11g	2412MHz	17.99	18.0
	2437MHz	17.33	
	2462MHz	17.11	
802.11n20M	2412MHz	17.74	18.0
	2437MHz	17.08	
	2462MHz	16.94	
802.11n40M	2422MHz	17.11	17.5
	2437MHz	16.41	
	2452MHz	16.32	

WiFi 5.2GHz

Mode	Freq (MHz)	Conducted average power output (dBm)	Tune-up(dBm)
802.11a	5180	16.78	17.5
	5220	17.19	
	5240	17.31	
802.11n20M	5180	16.66	17.5
	5220	17.04	
	5240	17.14	
802.11n40M	5190	15.83	16.5
	5230	16.08	
802.11ac20M	5180	16.55	17.5
	5220	17.10	
	5240	17.32	
802.11ac40M	5190	15.80	16.5
	5230	16.17	
802.11ac80M	5210	14.63	15.0

WiFi 5.3GHz

Mode	Freq (MHz)	Conducted average power output(dBm)	Tune-up(dBm)
802.11a	5260	16.93	17.5
	5280	17.09	
	5320	17.47	
802.11n20M	5260	16.88	17.5
	5280	16.81	
	5320	17.27	
802.11n40M	5270	15.96	16.5
	5310	16.32	
802.11ac20M	5260	16.80	17.5
	5280	16.86	
	5320	17.44	
802.11ac40M	5270	16.05	16.5
	5310	16.43	
802.11ac80M	5290	14.71	15.0

WiFi 5.5GHz

Mode	Freq (MHz)	Conducted average power output(dBm)	Tune-up(dBm)
802.11a	5500	17.54	19.0
	5580	18.62	
	5700	18.98	
802.11n20M	5500	17.44	19.5
	5580	18.28	
	5700	19.03	
802.11n40M	5510	16.86	18.0
	5590	17.47	
	5670	17.93	
802.11ac20M	5500	17.44	19.0
	5580	18.26	
	5700	18.83	
802.11ac40M	5510	16.87	18.0
	5590	17.40	
	5670	17.93	
802.11ac80M	5530	15.68	16.5
	5610	16.11	

WiFi 5.8GHz

Mode	Freq (MHz)	Conducted average power output(dBm)	Tune-up(dBm)
802.11a	5745	19.65	20.0
	5785	19.49	
	5825	19.44	
802.11n20M	5745	19.41	19.5
	5785	19.29	
	5825	19.17	
802.11n40M	5755	18.71	19.0
	5795	18.18	
802.11ac20M	5745	19.41	19.5
	5785	19.18	
	5825	19.06	
802.11ac40M	5755	18.77	19.0
	5795	18.22	
802.11ac80M	5775	17.29	17.5

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WiFi2.4GHz

Mode	Freq(MHz)	Average power output (dBm)	Tune-up(dBm)
802.11b	2412MHz	15.77	16.0
	2437MHz	15.28	
	2462MHz	14.76	
802.11g	2412MHz	15.88	16.0
	2437MHz	15.32	
	2462MHz	14.84	
802.11n20M	2412MHz	18.09	18.5
	2437MHz	17.47	
	2462MHz	16.93	
802.11n40M	2422MHz	17.20	17.5
	2437MHz	16.70	
	2452MHz	16.36	

WiFi 5.2GHz

Mode	Freq (MHz)	Conducted average power output (dBm)	Tune-up(dBm)
802.11a	5180	9.62	10.5
	5220	9.95	
	5240	10.10	
802.11n20M	5180	15.87	16.5
	5220	16.15	
	5240	16.26	
802.11n40M	5190	14.98	15.5
	5230	15.36	
802.11ac20M	5180	15.72	16.5
	5220	16.17	
	5240	16.42	
802.11ac40M	5190	14.95	15.5
	5230	15.34	
802.11ac80M	5210	13.76	14.0

WiFi 5.3GHz

Mode	Freq (MHz)	Conducted average power output(dBm)	Tune-up(dBm)
802.11a	5260	10.12	10.5
	5280	10.22	
	5320	10.27	
802.11n20M	5260	16.40	16.5
	5280	16.37	
	5320	16.38	
802.11n40M	5270	15.49	16.0
	5310	15.68	
802.11ac20M	5260	16.35	17.0
	5280	16.44	
	5320	16.67	
802.11ac40M	5270	15.57	16.0
	5310	15.79	
802.11ac80M	5290	14.26	14.5

WiFi 5.5GHz

Mode	Freq (MHz)	Conducted average power output(dBm)	Tune-up(dBm)
802.11a	5500	11.22	12.5
	5580	12.02	
	5700	11.20	
802.11n20M	5500	17.70	18.5
	5580	18.16	
	5700	17.65	
802.11n40M	5510	17.08	17.5
	5590	17.42	
	5670	16.83	
802.11ac20M	5500	17.56	18.5
	5580	18.19	
	5700	17.45	
802.11ac40M	5510	17.07	17.5
	5590	17.37	
	5670	16.80	
802.11ac80M	5530	15.84	16.0
	5610	15.55	

WiFi 5.8GHz

Mode	Freq (MHz)	Conducted average power output(dBm)	Tune-up(dBm)
802.11a	5745	11.59	12.0
	5785	11.68	
	5825	11.32	
802.11n20M	5745	16.98	18.0
	5785	17.97	
	5825	17.61	
802.11n40M	5755	17.26	17.5
	5795	16.87	
802.11ac20M	5745	17.83	18.0
	5785	17.92	
	5825	17.53	
802.11ac40M	5755	17.41	18.0
	5795	16.93	
802.11ac80M	5775	15.94	16.0

MIMO

WiFi2.4GHz

Mode	Freq(MHz)	Average power output (dBm)	Tune-up(dBm)
802.11n20M	2412MHz	20.21	20.5
	2437MHz	20.29	
	2462MHz	19.95	
802.11n40M	2422MHz	19.31	20.0
	2437MHz	18.73	
	2452MHz	19.35	

WiFi 5.2GHz

Mode	Freq (MHz)	Conducted average power output (dBm)	Tune-up(dBm)
802.11n20M	5180	19.29	20.0
	5220	19.63	
	5240	19.73	
802.11n40M	5190	18.44	19.0
	5230	18.75	
802.11ac20M	5180	19.17	20.0
	5220	19.67	
	5240	19.90	
802.11ac40M	5190	18.41	19.0
	5230	18.79	
802.11ac80M	5210	17.23	17.5

WiFi 5.3GHz

Mode	Freq (MHz)	Conducted average power output(dBm)	Tune-up(dBm)
802.11n20M	5260	19.66	20.0
	5280	19.61	
	5320	19.86	
802.11n40M	5270	18.74	19.5
	5310	19.02	
802.11ac20M	5260	19.59	20.5
	5280	19.67	
	5320	20.08	
802.11ac40M	5270	18.83	19.5
	5310	19.13	
802.11ac80M	5290	17.50	17.5

WiFi 5.5GHz

Mode	Freq (MHz)	Conducted average power output(dBm)	Tune-up(dBm)
802.11n20M	5500	20.58	21.5
	5580	21.23	
	5700	21.40	
802.11n40M	5510	19.98	20.5
	5590	20.46	
	5670	20.43	
802.11ac20M	5500	20.51	21.5
	5580	21.24	
	5700	21.20	
802.11ac40M	5510	19.98	20.5
	5590	20.40	
	5670	20.41	
802.11ac80M	5530	18.77	19.0
	5610	18.85	

WiFi 5.8GHz

Mode	Freq (MHz)	Conducted average power output(dBm)	Tune-up(dBm)
802.11n20M	5745	21.37	22.0
	5785	21.69	
	5825	21.47	
802.11n40M	5755	21.06	21.5
	5795	20.58	
802.11ac20M	5745	21.70	22.0
	5785	21.61	
	5825	21.37	
802.11ac40M	5755	21.15	21.5
	5795	20.63	
802.11ac80M	5775	19.68	20.0

5.2 Calculation result

FCC LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

(A) Limits for Occupational/Controlled Exposure ☐

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm2)	Averaging Time |E|2, |H|2 or S (minutes)
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f^2	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6

(B) Limits for General Population/Uncontrolled Exposure ☑

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm2)	Averaging Time |E|2, |H|2 or S (minutes)
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f^2	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz *Plane-wave equivalent power density

Calculation procedure:

According to §2.1091, §2.1093, §1.1307(b) and §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

The $S = PG / (4\pi R^2)$

Where S = power density in mW/cm^2

P = transmit power in mW

G = numeric gain of transmit antenna

R = distance (cm)

The calculations in the table below use the highest gain of antenna for client EUT. These calculations represent worst case in terms of the exposure levels.

Band	Freq. (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Average EIRP (mW)	Power Density at 20cm (mW/cm^2)	Limit (mW/cm^2)	Power Density / Limit
BT	2480.00	0.7	7.5	8.2	6.61	0.001	1.00	0.001
BLE	2440.00	0.7	8.5	9.2	8.32	0.002	1.00	0.002
WLAN2.4GHz Band	2412	3.5	20.5	24.0	251.19	0.050	1.00	0.050
WLAN5.2GHz Band	5240	3.3	20.0	23.3	213.80	0.043	1.00	0.043
WLAN5.3GHz Band	5320	3.3	20.5	23.8	239.88	0.048	1.00	0.048
WLAN5.6GHz Band	5700	3.3	21.5	24.8	302.00	0.060	1.00	0.060
WLAN5.8GHz Band	5745	3.3	22.0	25.3	338.84	0.067	1.00	0.067

Note:

For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.

Worst Simultaneous Transmission Result

BT Power Density / Limit	WLAN Power Density / Limit	Σ(Power Density / Limit) of BT+ WLAN
0.002	0.067	0.069

Note: Simultaneous Transmission Limit=Power Density_1/ limit_1 + Power Density_2/ limit_2<1

According to the KDB447498 D01 section 7.1 determine the device is exclusion from SAR test.

---End of Test Report---