

MPE REPORT

Report No.: SRTC2023-9004(F)-23020801(I)
Product Name: BT/Wi-Fi Module
Model Name: MWH530B
Applicant: Qingdao Hisense Communication Co., Ltd
Manufacturer: Qingdao Hisense Communication Co., Ltd
FCC ID : SARMWH530B

Reference Specification
FCC Part§1.1310

The State Radio_monitoring_center Testing Center (SRTC)

15th Building, No.30 Shixing Street, ShijingshanDistrict, Beijing,P.R.China

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1 GENERAL INFORMATION

1.1 Notes of the test report

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The certification and accreditation identifiers used in this report shall not be applicable to the tested or calibrated samples thereof. The manufacturer shall not mark the tested samples or items (or a separate part of the item) with the identifiers of certification and accreditation to mislead relevant parties about the tested samples or items.

1.2 Information about the testing laboratory

Company:	The State Radio_monitoring_center Testing Center (SRTC)
Designation number:	CN1267
Registration number:	239125
Certificate Number:	5055.02
Address:	15th Building, No.30 Shixing Street, Shijingshan District, Beijing P.R.China
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1.3 Applicant's details

Company:	Qingdao Hisense Communication Co., Ltd
Address:	No.218, Qianwangang Road, Economic and Technological Development Zone, Qingdao, Shandong Province,China

1.4 Manufacturer's details

Company:	Qingdao Hisense Communication Co., Ltd
Address:	No.218, Qianwangang Road, Economic and Technological Development Zone, Qingdao, Shandong Province,China

1.5 Test environment

Date of Receipt of test sample at SRTC:	2023/03/21
Testing Start Date:	2023/03/22
Testing End Date:	2023/03/29

Environmental Data:	Temperature (°C)	Humidity (%)
Ambient	25	40
Maximum Extreme	70	---
Minimum Extreme	-10	---

Normal Supply Voltage (V d.c.):	4.5
Maximum Extreme Supply Voltage (V d.c.):	5
Minimum Extreme Supply Voltage (V d.c.):	5.5

2 DESCRIPTION OF THE EQUIPMENT UNDER TEST

2.1 Final equipment build status

BT:

Frequency Range:	2.402GHz~2.480GHz
Number of Channel:	79
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK
Duplex Mode:	TDD
Channel Spacing:	1MHz
Data Rate:	1Mbps, 2 Mbps, 3 Mbps
Antenna Gain:	2.08 dBi
Power Supply:	DC supply
Software Revision:	NA
Hardware Revision:	V1.00

BLE:

Frequency Range:	2.402GHz~2.480GHz
Number of Channel:	40
Modulation Type:	GFSK
Equipment Class:	DTS
Channel Spacing:	2MHz
Data Rate:	LE 1Mbps/2Mbps/ Coded 125K/Coded 500K
Antenna Gain:	2.08 dBi
Power Supply:	DC supply
Software Revision:	NA
Hardware Revision:	V1.00

WIFI 2.4G

Frequency Band:	2.412GHz~2.462GHz
Number of Channel For 20MHz:	11

Number of Channel For 40MHz:	7
Modulation Type:	802.11b 802.11g 802.11n (HT20/HT40)
Power Supply:	DC supply
Software Revision:	NA
Hardware Revision:	V1.00
Antenna gain	ANT0 gain: 2.35dBi ANT1 gain: 1.22dBi

WIFI 5G




Frequency Band(s):	U-NII-1:5150MHz-5250MHz UNII-2A 5250-5350MHz UNII-2C 5475-5725MHz U-NII-3:5725MHz-5850MHz	
The DFS related operating mode(s) of the equipment:	<input type="checkbox"/>	Master
	<input type="checkbox"/>	Slave with radar detection
	<input checked="" type="checkbox"/>	Slave without radar detection
Modulation Type:	802.11a 802.11n (HT20&HT40) 802.11ac (VHT20&VHT40&VHT80)	
Antenna Type:	PCB	
Antenna Gain:	ANT0:2.1dBi/ANT1:2.41dBi	
Power Supply:	DC supply	
Software Revision:	NA	
Hardware Revision:	V1.00	

3 SPECIFICATION

Specification	Version	Title
Part 1.1310	Latest	Radio frequency radiation exposure limits.

4 RESULT SUMMARY

Case	Verdict
MPE	Pass

This Test Report Is Issued by: Mr. Peng Zhen 	Checked by: Mr. Li Bin 
Tested by: 	Issued date: 2023/04/04

5 CALCULATION RESULT

5.1 Average output power

BT

Test Mode	Frequency (MHz)	Average power output (dBm)	Tune up (dBm)
GFSK(DH5)	2402MHz	5.66	6.0
$\pi/4$ DQPSK(2DH5)	2402MHz	5.33	5.5
8DPSK(3DH5)	2402MHz	4.62	5.0
GFSK(DH5)	2441MHz	5.73	6.0
$\pi/4$ DQPSK(2DH5)	2441MHz	4.84	5.0
8DPSK(3DH5)	2441MHz	5.23	5.5
GFSK(DH5)	2480MHz	5.47	5.5
$\pi/4$ DQPSK(2DH5)	2480MHz	5.36	5.5
8DPSK(3DH5)	2480MHz	5.07	5.5

BLE

Test Mode	Frequency (MHz)	Average power output (dBm)	Tune up (dBm)
GFSK (LE 1Mbps)	2402MHz	3.73	4.0
GFSK (LE 2Mbps)	2402MHz	3.71	4.0
Coded 125K	2402MHz	3.93	4.0
Coded 500K	2402MHz	3.97	4.0
GFSK (LE 1Mbps)	2440MHz	3.86	4.0
GFSK (LE 2Mbps)	2440MHz	3.95	4.0
Coded 125K	2440MHz	4.01	4.5
Coded 500K	2440MHz	4.05	4.5
GFSK (LE 1Mbps)	2480MHz	3.92	4.0
GFSK (LE 2Mbps)	2480MHz	3.80	4.0
Coded 125K	2480MHz	3.95	4.0
Coded 500K	2480MHz	3.76	4.0

2.4G Wifi

Test Mode	Frequency (MHz)	Antenna	Average power output (dBm)	Tune up (dBm)
802.11b	2412	Chain0	15.62	16.0
802.11b	2412	Chain1	15.64	16.0
802.11b	2437	Chain0	15.25	15.5
802.11b	2437	Chain1	15.25	15.5
802.11b	2462	Chain0	15.34	15.5
802.11b	2462	Chain1	15.29	15.5
802.11g	2412	Chain0	15.11	15.5
802.11g	2412	Chain1	15.13	15.5
802.11g	2437	Chain0	14.83	15.0
802.11g	2437	Chain1	14.85	15.0
802.11g	2462	Chain0	14.89	15.0
802.11g	2462	Chain1	14.93	15.0
802.11n HT20	2412	Chain0	12.16	12.5
802.11n HT20	2412	Chain1	12.18	12.5
802.11n HT20	2412	MIMO	15.18	15.5
802.11n HT20	2437	Chain0	11.96	12.0
802.11n HT20	2437	Chain1	11.98	12.0
802.11n HT20	2437	MIMO	14.98	15.0
802.11n HT20	2462	Chain0	11.95	12.0
802.11n HT20	2462	Chain1	11.94	12.0
802.11n HT20	2462	MIMO	14.96	15.0
802.11n HT40	2422	Chain0	11.28	11.5
802.11n HT40	2422	Chain1	11.26	11.5
802.11n HT40	2422	MIMO	14.28	14.5
802.11n HT40	2437	Chain0	11.16	11.5
802.11n HT40	2437	Chain1	11.16	11.5
802.11n HT40	2437	MIMO	14.17	14.5
802.11n HT40	2452	Chain0	11.25	11.5

802.11n HT40	2452	Chain1	11.24	11.5
802.11n HT40	2452	MIMO	14.26	14.5

5G WIFI

Mode	Frequency (MHz)	Antenna	Conducted average power output(dBm)	Tune up (dBm)
802.11a	5180	Chain0	15.35	15.5
802.11a	5180	Chain1	15.64	16.0
802.11a	5220	Chain0	15.30	15.5
802.11a	5220	Chain1	15.14	15.5
802.11a	5240	Chain0	15.03	15.5
802.11a	5240	Chain1	14.87	15.0
802.11n HT20	5180	Chain0	11.69	12.0
802.11n HT20	5180	Chain1	11.82	12.0
802.11n HT20	5180	MIMO	14.77	15.0
802.11n HT20	5220	Chain0	11.03	11.5
802.11n HT20	5220	Chain1	11.21	11.5
802.11n HT20	5220	MIMO	14.13	14.5
802.11n HT20	5240	Chain0	11.24	11.5
802.11n HT20	5240	Chain1	11.14	11.5
802.11n HT20	5240	MIMO	14.20	14.5
802.11ac VHT20	5180	Chain0	11.73	12.0
802.11ac VHT20	5180	Chain1	11.70	12.0
802.11ac VHT20	5180	MIMO	14.73	15.0
802.11ac VHT20	5220	Chain0	11.31	11.5
802.11ac VHT20	5220	Chain1	11.13	11.5
802.11ac VHT20	5220	MIMO	14.23	14.5
802.11ac VHT20	5240	Chain0	11.62	12.0
802.11ac VHT20	5240	Chain1	11.52	12.0
802.11ac VHT20	5240	MIMO	14.58	15.0
802.11n HT40	5190	Chain0	11.25	11.5

802.11n HT40	5190	Chain1	11.21	11.5
802.11n HT40	5190	MIMO	14.24	14.5
802.11n HT40	5230	Chain0	10.97	11.0
802.11n HT40	5230	Chain1	10.67	11.0
802.11n HT40	5230	MIMO	13.83	14.0
802.11ac VHT40	5190	Chain0	11.10	11.5
802.11ac VHT40	5190	Chain1	11.29	11.5
802.11ac VHT40	5190	MIMO	14.21	14.5
802.11ac VHT40	5230	Chain0	11.18	11.5
802.11ac VHT40	5230	Chain1	11.18	11.5
802.11ac VHT40	5230	MIMO	14.19	14.5
802.11ac VHT80	5210	Chain0	10.68	11.0
802.11ac VHT80	5210	Chain1	10.67	11.0
802.11ac VHT80	5210	MIMO	13.69	14.0

Mode	Frequency (MHz)	Antenna	Conducted average power output(dBm)	Tune up (dBm)
802.11a	5180	Chain0	15.55	16.0
802.11a	5180	Chain1	15.43	15.5
802.11a	5220	Chain0	15.76	16.0
802.11a	5220	Chain1	15.66	16.0
802.11a	5240	Chain0	15.79	16.0
802.11a	5240	Chain1	15.76	16.0
802.11n HT20	5180	Chain0	11.51	12.0
802.11n HT20	5180	Chain1	11.26	11.5
802.11n HT20	5180	MIMO	14.40	14.5
802.11n HT20	5220	Chain0	11.53	12.0
802.11n HT20	5220	Chain1	11.51	12.0
802.11n HT20	5220	MIMO	14.53	15.0
802.11n HT20	5240	Chain0	11.62	12.0
802.11n HT20	5240	Chain1	11.60	12.0

802.11n HT20	5240	MIMO	14.62	15.0
802.11ac VHT20	5180	Chain0	11.62	12.0
802.11ac VHT20	5180	Chain1	11.54	12.0
802.11ac VHT20	5180	MIMO	14.59	15.0
802.11ac VHT20	5220	Chain0	11.65	12.0
802.11ac VHT20	5220	Chain1	11.56	12.0
802.11ac VHT20	5220	MIMO	14.62	15.0
802.11ac VHT20	5240	Chain0	11.82	12.0
802.11ac VHT20	5240	Chain1	11.79	12.0
802.11ac VHT20	5240	MIMO	14.82	15.0
802.11n HT40	5190	Chain0	11.17	11.5
802.11n HT40	5190	Chain1	11.15	11.5
802.11n HT40	5190	MIMO	14.17	14.5
802.11n HT40	5230	Chain0	11.44	11.5
802.11n HT40	5230	Chain1	11.34	11.5
802.11n HT40	5230	MIMO	14.40	14.5
802.11ac VHT40	5190	Chain0	11.30	11.5
802.11ac VHT40	5190	Chain1	11.22	11.5
802.11ac VHT40	5190	MIMO	14.27	14.5
802.11ac VHT40	5230	Chain0	11.41	11.5
802.11ac VHT40	5230	Chain1	11.44	11.5
802.11ac VHT40	5230	MIMO	14.44	14.5
802.11ac VHT80	5210	Chain0	9.99	10.0
802.11ac VHT80	5210	Chain1	9.96	10.0
802.11ac VHT80	5210	MIMO	12.99	13.0

Mode	Frequency (MHz)	Antenna	Conducted average power output(dBm)	Tune up (dBm)
802.11a	5500	Chain0	15.61	16.0
802.11a	5500	Chain1	15.66	16.0
802.11a	5580	Chain0	15.14	15.5

802.11a	5580	Chain1	15.13	15.5
802.11a	5700	Chain0	14.87	15.0
802.11a	5700	Chain1	14.86	15.0
802.11n HT20	5500	Chain0	11.76	12.0
802.11n HT20	5500	Chain1	11.74	12.0
802.11n HT20	5500	MIMO	14.76	15.0
802.11n HT20	5580	Chain0	12.08	12.5
802.11n HT20	5580	Chain1	12.13	12.5
802.11n HT20	5580	MIMO	15.12	15.5
802.11n HT20	5700	Chain0	11.87	12.0
802.11n HT20	5700	Chain1	11.87	12.0
802.11n HT20	5700	MIMO	14.88	15.0
802.11ac VHT20	5500	Chain0	11.65	12.0
802.11ac VHT20	5500	Chain1	11.64	12.0
802.11ac VHT20	5500	MIMO	14.66	15.0
802.11ac VHT20	5580	Chain0	11.94	12.0
802.11ac VHT20	5580	Chain1	12.03	12.5
802.11ac VHT20	5580	MIMO	15.00	15.0
802.11ac VHT20	5700	Chain0	11.83	12.0
802.11ac VHT20	5700	Chain1	11.87	12.0
802.11ac VHT20	5700	MIMO	14.86	15.0
802.11n HT40	5510	Chain0	11.74	12.0
802.11n HT40	5510	Chain1	11.76	12.0
802.11n HT40	5510	MIMO	14.76	15.0
802.11n HT40	5590	Chain0	11.67	12.0
802.11n HT40	5590	Chain1	11.71	12.0
802.11n HT40	5590	MIMO	14.70	15.0
802.11n HT40	5670	Chain0	11.61	12.0
802.11n HT40	5670	Chain1	11.63	12.0
802.11n HT40	5670	MIMO	14.63	15.0
802.11ac VHT40	5510	Chain0	11.76	12.0
802.11ac VHT40	5510	Chain1	11.84	12.0

802.11ac VHT40	5510	MIMO	14.81	15.0
802.11ac VHT40	5590	Chain0	11.74	12.0
802.11ac VHT40	5590	Chain1	11.82	12.0
802.11ac VHT40	5590	MIMO	14.79	15.0
802.11ac VHT40	5670	Chain0	11.62	12.0
802.11ac VHT40	5670	Chain1	11.68	12.0
802.11ac VHT40	5670	MIMO	14.66	15.0
802.11ac VHT80	5530	Chain0	10.45	10.5
802.11ac VHT80	5530	Chain1	10.49	10.5
802.11ac VHT80	5530	MIMO	13.48	13.5

Mode	Frequency (MHz)	Antenna	Conducted average power output(dBm)	Tune up (dBm)
802.11a	5745	Chain0	14.88	15.0
802.11a	5745	Chain1	14.93	15.0
802.11a	5785	Chain0	14.77	15.0
802.11a	5785	Chain1	14.79	15.0
802.11a	5825	Chain0	14.96	15.0
802.11a	5825	Chain1	14.88	15.0
802.11n HT20	5745	Chain0	11.91	12.0
802.11n HT20	5745	Chain1	11.91	12.0
802.11n HT20	5745	MIMO	14.92	15.0
802.11n HT20	5785	Chain0	11.66	12.0
802.11n HT20	5785	Chain1	11.73	12.0
802.11n HT20	5785	MIMO	14.71	15.0
802.11n HT20	5825	Chain0	11.85	12.0
802.11n HT20	5825	Chain1	11.74	12.0
802.11n HT20	5825	MIMO	14.81	15.0
802.11ac VHT20	5745	Chain0	11.80	12.0
802.11ac VHT20	5745	Chain1	11.70	12.0

802.11ac VHT20	5745	MIMO	14.76	15.0
802.11ac VHT20	5785	Chain0	11.69	12.0
802.11ac VHT20	5785	Chain1	11.66	12.0
802.11ac VHT20	5785	MIMO	14.69	15.0
802.11ac VHT20	5825	Chain0	11.83	12.0
802.11ac VHT20	5825	Chain1	11.79	12.0
802.11ac VHT20	5825	MIMO	14.82	15.0
802.11n HT40	5755	Chain0	11.51	12.0
802.11n HT40	5755	Chain1	11.56	12.0
802.11n HT40	5755	MIMO	14.55	15.0
802.11n HT40	5795	Chain0	11.32	11.5
802.11n HT40	5795	Chain1	11.38	11.5
802.11n HT40	5795	MIMO	14.36	14.5
802.11ac VHT40	5755	Chain0	11.60	12.0
802.11ac VHT40	5755	Chain1	11.58	12.0
802.11ac VHT40	5755	MIMO	14.60	15.0
802.11ac VHT40	5795	Chain0	11.57	12.0
802.11ac VHT40	5795	Chain1	11.48	11.5
802.11ac VHT40	5795	MIMO	14.54	15.0
802.11ac VHT80	5775	Chain0	10.19	10.5
802.11ac VHT80	5775	Chain1	10.18	10.5
802.11ac VHT80	5775	MIMO	13.20	13.5

5.2 Maximum permissible exposure(MPE)

Limit:

(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/cm ²)	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/cm ²)	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

Result:

According to§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 levels 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:

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

Where S = power density in mW/cm²

P = transmit power in mW

G = numeric gain of transmit antenna

R = distance (cm)

Standalone Transmission Result

Band	Freq. (MHz)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density/ Limit
BT	2441	6.00	8.08	6.427	0.001	1	0.001
BLE	2440	4.50	6.58	4.550	0.001	1	0.001
2.4G WIFI	2412	16.00	18.35	68.391	0.014	1	0.014
5G WIFI	5180	16.00	18.41	69.343	0.014	1	0.014

Simultaneous Transmission Result

2.4G WIFI Power Density1 / Limit	5G WIFI Power Density2 / Limit	Σ(Power Density / Limit)
0.0014	0.0014	0.002

Note: Simultaneous Transmission Limit = Power Density_1 / Limit_1 + Power Density_2 / Limit_2 < 1.