



Maximum Permissible Exposure Evaluation

FCC ID: 2AW68-N37663U**IC: 20522-N37663U**

1. Client Information


Applicant	:	Shenzhen SDMC Technology Co.,Ltd
Address	:	Room 1022, Floor 10, Building A, Customs Building, No. 2, Xin'an 3rd Road, Dalang Community, Xin'an Street, Bao'an District, Shenzhen, China
Manufacturer	:	Shenzhen SDMC Technology Co.,Ltd
Address	:	Room 1022, Floor 10, Building A, Customs Building, No. 2, Xin'an 3rd Road, Dalang Community, Xin'an Street, Bao'an District, Shenzhen, China

2. General Description of EUT



EUT Name	:	Wi-Fi BT Module
Models No./HVIN	:	CDW-N37663U-02
Model Different	:	N/A
Brand Name	:	N/A
Sample ID	:	HC-C-202403-0360-02-01
Product Description	:	Operation Frequency: Bluetooth 5.1: 2402MHz~2480MHz U-NII-1: 5180MHz~5240MHz U-NII-2A: 5260MHz~5320MHz U-NII-2C: 5500MHz~5720MHz U-NII-3: 5745MHz~5825MHz 802.11b/g/n(HT20)/n(HT40): 2412MHz~2462MHz
Power Rating	:	DC 3.3V
Software Version	:	N/A
Hardware Version	:	N/A
Remark	:	The antenna gain provided by the manufacturer, the verified for the RF conduction test provided by TOBY test lab.

Method of Measurement for FCC

1. Max. Antenna Gain:

Antenna(XINGHE)				
Antenna Type: FPC	Model:	YX-PH1020-WIFI0-V1.0	Max. Gain:	2.4G: 3.56dBi
				U-NII-1: 5.77dBi
				U-NII-2A: 5.90dBi
				U-NII-2C: 5.60dBi
				U-NII-3: 5.42dBi
		YX-PH1020-WIFI1-V1.0	Max. Gain:	2.4G: 3.67dBi
				U-NII-1: 4.77dBi
				U-NII-2A: 5.04dBi
				U-NII-2C: 5.08dBi
				U-NII-3: 4.03dBi
				
Antenna(YIJIA)				
Antenna Type: FPC	Model:	JY-W0-24-13	Max. Gain:	2.4G: 3.80dBi
				U-NII-1: 4.30dBi
				U-NII-2A: 4.30dBi
				U-NII-2C: 4.60dBi
				U-NII-3: 4.50dBi
		JY-W1-24-13	Max. Gain:	2.4G: 3.20dBi
				U-NII-1: 4.40dBi
				U-NII-2A: 4.50dBi
				U-NII-2C: 4.50dBi
				U-NII-3: 4.50dBi
				



Antenna(XINGHE)		
Antenna Type: FPC	Model: YX-PH1020-BT-V1.0	Max. Gain: 1.91dBi
		
Antenna(YIJIA)		
Antenna Type: PCB	Model: JY-BT-24-13	Max. Gain: 4.70dBi
		

2. EUT Operation Condition:

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

3. Exposure Evaluation:

Equation from page 18 of OET Bulletin 65, Edition 97-01

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

Where

S: power density

P: power input to the antenna

G: power gain of the antenna in the direction of interest relative to an isotropic radiator.

R: distance to the center of radiation of the antenna

Simultaneous transmission MPE Considerations

According to KDB447498: All transmitters and antennas in the host must be either evaluated for MPE compliance, by measurement or computational modeling, or qualify for the standalone MPE test exclusion in section 7.1. Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0 .

This means that:

$$\sum \text{ of MPE ratios } \leq 1.0$$



4. Test Result:

Worst MPE Result							
Test Mode	Antenna	Conducted Power(max) (dBm)	Turn-up Power (dB)	Max tune up power (dBm) [P]	Max. ANT Gain (dBi) [G]	Distance (cm) [R]	Power Density (mW/ cm ²) [S]
Bluetooth&BLE	/	7.28	8±1	9	4.70	20	0.0047
2.4G b	Ant1	18.18	18±1	19	3.80	20	0.0379
	Ant2	17.97	18±1	19	3.67	20	0.0368
2.4G g	Ant1	14.88	15±1	16	3.80	20	0.0190
	Ant2	14.83	15±1	16	3.67	20	0.0184
2.4G n20	Ant1	13.63	14±1	15	3.80	20	0.0151
	Ant2	13.71	14±1	15	3.67	20	0.0146
2.4G n40	Ant1	11.63	11±1	12	3.80	20	0.0076
	Ant2	11.91	11±1	12	3.67	20	0.0073
5G a	Ant1	17.82	18±1	19	5.90	20	0.0615
	Ant2	18.05	18±1	19	5.08	20	0.0509
5G n20	Ant1	15.97	16±1	17	5.90	20	0.0388
	Ant2	16.20	16±1	17	5.08	20	0.0321
5G n40	Ant1	16.42	16±1	17	5.90	20	0.0388
	Ant2	16.61	16±1	17	5.08	20	0.0321
5G ac20	Ant1	15.92	16±1	17	5.90	20	0.0388
	Ant2	16.28	16±1	17	5.08	20	0.0321
5G ac40	Ant1	16.38	16±1	17	5.90	20	0.0388
	Ant2	16.53	16±1	17	5.08	20	0.0321
5G ac80	Ant1	16.09	16±1	17	5.90	20	0.0388
	Ant2	16.43	16±1	17	5.08	20	0.0321

Note: The antenna gain used max. antenna gain



5. Conclusion:

As specified in Table 1B of 47 CFR 1.1310- Limits for Maximum Permissible Exposure (MPE),

Limits for General Population/ Uncontrolled Exposure

Frequency Range (MHz)	Power density (mW/ cm ²)
300-1,500	F/1500
1,500-100,000	1.0

For: 2402~2480MHz&2412~2462MHz&5180~5825MHz

MPE limit S: 1mW/ cm²

The MPE is calculated as **0.0615mW / cm² < limit 1mW / cm²**.

6. Summary simultaneous transmission information

Modulation Type	Work Frequency Band	Transmit Antenna		MIMO
		Antenna 1	Antenna 2	
Bluetooth	2.4GHz	Yes	/	/
Bluetooth LE	2.4GHz	Yes	/	/
IEEE 802.11a	U-NII-1/ U-NII-2A U-NII-2C/ U-NII-3	Yes	Yes	No
IEEE 802.11b	2.4GHz	Yes	Yes	No
IEEE 802.11g	2.4GHz	Yes	Yes	No
IEEE 802.11n HT20	2.4GHz	Yes	Yes	Yes
IEEE 802.11n HT40	2.4GHz	Yes	Yes	Yes
IEEE 802.11n HT20	U-NII-1/ U-NII-2A U-NII-2C/ U-NII-3	Yes	Yes	Yes
IEEE 802.11n HT40	U-NII-1/ U-NII-2A U-NII-2C/ U-NII-3	Yes	Yes	Yes
IEEE 802.11ac VHT20	U-NII-1/ U-NII-2A U-NII-2C/ U-NII-3	Yes	Yes	Yes
IEEE 802.11ac VHT40	U-NII-1/ U-NII-2A U-NII-2C/ U-NII-3	Yes	Yes	Yes
IEEE 802.11ac VHT80	U-NII-1/ U-NII-2A U-NII-2C/ U-NII-3	Yes	Yes	Yes



7. Summary simultaneous transmission results

Antenna 1 and Antenna 2 for 2.4GWLAN & 5GWLAN

Worst Modulation Type	MPE Antenna 1 (mW/cm ²)	MPE Antenna 2 (mW/cm ²)	ΣMPE ratios	Limit	Results
IEEE 802.11b	0.0379	0.0368	0.0747	1.0	PASS
IEEE 802.11a	0.0615	0.0509	0.1124	1.0	PASS

Bluetooth and WiFi support Synchronization transmitter

Maximum MPE ratio Bluetooth	Maximum MPE ratio WiFi	ΣMPE ratios	Limit	Results
0.0047	0.1124	0.1771	1	PASS

So, RF exposure limit warning or SAR test are not required.

The EUT will only be used with a separation of 20cm or greater between the antenna and nearby persons and can therefore be considered a mobile transmitter per 47 CFR 2.1091 (b). The RF Exposure Information page from the manual is included here for reference.



Method Of Measurement for IC

1. Applicable Standard

[Radio Standards Specification 102](#), Radio Frequency (RF) Exposure Compliance of Radio communication Apparatus (All Frequency Bands), sets out the requirements and measurement techniques used to evaluate radio frequency (RF) exposure compliance of radio communication apparatus designed to be used within the vicinity of the human body.

[ANSI C95.1-1999](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

[FCC KDB publication 447498 D01 General RF Exposure Guidance v06](#): Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

2. Evaluation Method and Limit

According to RSS-102 §4 Table 4, RF Filed Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10 ²¹	83	90	-	Instantaneous*
0.1-10	-	0.73/ <i>f</i>	-	6**
1.1-10	87/ <i>f</i> ^{0.5}	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ <i>f</i> ^{0.25}	0.1540/ <i>f</i> ^{0.25}	8.944/ <i>f</i> ^{0.5}	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 <i>f</i> ^{0.3417}	0.008335 <i>f</i> ^{0.3417}	0.02619 <i>f</i> ^{0.6834}	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ <i>f</i> ^{1.2}
150000-300000	0.158 <i>f</i> ^{0.5}	4.21 x 10 ⁻⁴ <i>f</i> ^{0.5}	6.67 x 10 ⁻⁵ <i>f</i>	616000/ <i>f</i> ^{1.2}

Note: *f* is frequency in MHz.
*Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

Frequency Band	<i>f</i> (MHz)	Limit of Power Density (W/m ²)
2.4G	2402	5.35
5G	5180	9.05

Note: Limit=0.02619 *f*^{0.6834} (where *f* is in MHz).
The *f* in the limit is the frequency of the lowest Channel.



3. Calculation Formula

Prediction of power density at the distance of the applicable MPE limit:

$$S = \frac{PG}{4\pi R^2} = \text{Power density (in appropriate units, e.g. W/m}^2\text{)}$$

P=power input to antenna (in appropriate units, e.g. W)

G=power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R=distance to the center of radiation of the antenna (in appropriate units, e.g. m)

Simultaneous transmission MPE Considerations

According to KDB447498: All transmitters and antennas in the host must be either evaluated for MPE compliance, by measurement or computational modeling, or qualify for the standalone MPE test exclusion in section 7.1. Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0 .

This means that:

$$\sum \text{ of MPE ratios} \leq 1.0$$



4. Evaluation Results

Worst MPE Result							
Test Mode	Antenna	Conducted Power(max) (dBm)	Turn-up Power (dB)	Max tune up power (dBm) [P]	Max. ANT Gain (dBi) [G]	Distance (m) [R]	Power Density (W/m ²) [S]
Bluetooth	/	7.28	8±1	9	4.70	0.2	0.047
2.4G b	Ant1	18.18	18±1	19	3.80	0.2	0.379
	Ant2	17.97	18±1	19	3.67	0.2	0.368
2.4G g	Ant1	14.88	15±1	16	3.80	0.2	0.090
	Ant2	14.83	15±1	16	3.67	0.2	0.184
2.4G n20	Ant1	13.63	14±1	15	3.80	0.2	0.151
	Ant2	13.71	14±1	15	3.67	0.2	0.146
2.4G n40	Ant1	11.63	11±1	12	3.80	0.2	0.076
	Ant2	11.91	11±1	12	3.67	0.2	0.073
5G a	Ant1	17.82	18±1	19	5.90	0.2	0.615
	Ant2	18.05	18±1	19	5.08	0.2	0.509
5G n20	Ant1	15.97	16±1	17	5.90	0.2	0.388
	Ant2	16.20	16±1	17	5.08	0.2	0.321
5G n40	Ant1	16.42	16±1	17	5.90	0.2	0.388
	Ant2	16.61	16±1	17	5.08	0.2	0.321
5G ac20	Ant1	15.92	16±1	17	5.90	0.2	0.388
	Ant2	16.28	16±1	17	5.08	0.2	0.321
5G ac40	Ant1	16.38	16±1	17	5.90	0.2	0.388
	Ant2	16.53	16±1	17	5.08	0.2	0.321
5G ac80	Ant1	16.09	16±1	17	5.90	0.2	0.388
	Ant2	16.43	16±1	17	5.08	0.2	0.321

Note: The antenna gain used max. antenna gain

6. Summary simultaneous transmission information

Modulation Type	Work Frequency Band	Transmit Antenna		MIMO
		Antenna 1	Antenna 2	
Bluetooth	2.4GHz	Yes	/	/
Bluetooth LE	2.4GHz	Yes	/	/
IEEE 802.11a	U-NII-1/ U-NII-2A U-NII-2C/ U-NII-3	Yes	Yes	No
IEEE 802.11b	2.4GHz	Yes	Yes	No
IEEE 802.11g	2.4GHz	Yes	Yes	No
IEEE 802.11n HT20	2.4GHz	Yes	Yes	Yes
IEEE 802.11n HT40	2.4GHz	Yes	Yes	Yes
IEEE 802.11n HT20	U-NII-1/ U-NII-2A U-NII-2C/ U-NII-3	Yes	Yes	Yes
IEEE 802.11n HT40	U-NII-1/ U-NII-2A U-NII-2C/ U-NII-3	Yes	Yes	Yes
IEEE 802.11ac VHT20	U-NII-1/ U-NII-2A U-NII-2C/ U-NII-3	Yes	Yes	Yes
IEEE 802.11ac VHT40	U-NII-1/ U-NII-2A U-NII-2C/ U-NII-3	Yes	Yes	Yes
IEEE 802.11ac VHT80	U-NII-1/ U-NII-2A U-NII-2C/ U-NII-3	Yes	Yes	Yes



7. Summary simultaneous transmission results

Antenna 1 and Antenna 2 for 2.4GWLAN& 5GWLAN

Worst Modulation Type	MPE Antenna 1 (W/m ²)	MPE Antenna 2 (W/m ²)	MPE Antenna 1+2 (W/m ²)	Limit (W/m ²)	ΣMPE Ratios	Results
IEEE 802.11b	0.379	0.368	0.747	5.35	0.140	PASS
IEEE 802.11a	0.615	0.509	1.124	9.05	0.124	PASS

Bluetooth and WiFi support Synchronization transmitter

Maximum MPE ratio Bluetooth	Maximum MPE ratio WiFi	ΣMPE ratios	Limit	Results
0.009	0.140	0.149	1	PASS

Remark:

1. Output power including turn-up tolerance;
2. MPE evaluate distance is 20cm from user manual provide by manufacturer.

Note

For a more detailed features description, please refer to the RF Test Report.

-----END OF REPORT-----

