

1. RF Exposure Requirements

1.1 General Information

Client Information

Applicant: SHENZHEN OFEIXIN TECHNOLOGY LIMITED
Address of applicant: Room 503, Building A3, Area B, Songbai Industrial Park, Guangming District, Shenzhen

Manufacturer: SHENZHEN OFEIXIN TECHNOLOGY LIMITED
Address of manufacturer: Room 503, Building A3, Area B, Songbai Industrial Park, Guangming District, Shenzhen

General Description of EUT:

Product Name: Wi-Fi Tri-band 2x2 MIMO DBS 802.11ax + Bluetooth 5.2 Module
Trade Name: OFLYCOMM
Model No.: O2066PM
Adding Model(s): /
Rated Voltage: DC3.3V
Battery Capacity: /
FCC ID: 2AT5W-O2066PM
Equipment Type: Mobile device

Technical Characteristics of EUT:

Bluetooth

Bluetooth Version: V5.2 (BR/EDR/LE mode)
Frequency Range: 2402-2480MHz
RF Output Power: 11.88dBm (Conducted)
Data Rate: 1Mbps, 2Mbps, 3Mbps
Modulation: GFSK, $\pi/4$ DQPSK, 8DPSK
Quantity of Channels: 79/40
Channel Separation: 1MHz/2MHz
Type of Antenna: FPC Antenna
Antenna Gain: 3.0dBi

Wi-Fi(2.4GHz)

Support Standards: 802.11b, 802.11g, 802.11n, 802.11ax
Frequency Range: 2412-2462MHz for 802.11b/g/n/ax(HT20/HE20)
2422-2452MHz for 802.11n/ax(HT40/HE40)
RF Output Power: Antenna 1:15.41dBm (Conducted)
Antenna 2:15.36dBm (Conducted)
AX: CCK, OFDM, QPSK, BPSK, 16QAM, 64QAM, 1024QAM
Quantity of Channels: 11 for 802.11b/g/n/ax(HT20/HE20); 7 for 802.11n/ax(HT40/HE40)
Channel Separation: 5MHz
Type of Antenna: FPC Antenna

Antenna Gain:	3.0dBi
Wi-Fi(5GHz)	
Support Standards:	802.11a, 802.11n-HT20 , 802.11n-HT40, 802.11ac-VHT80, 802.11ac-VHT160, 802.11ax-HE20, 802.11ax-HE40, 802.11ax-HE80, 802.11ax-HE160
Frequency Range:	5150-5250MHz, 5250-5350MHz, 5470-5725MHz, 5725-5850MHz 5150-5250MHz: Antenna 0: 16.83dBm (Conducted) Antenna 1: 16.70dBm (Conducted) 5250-5350MHz: Antenna 0: 16.87dBm (Conducted) Antenna 1: 16.59dBm (Conducted)
RF Output Power:	5470-5725MHz: Antenna 0: 16.42dBm (Conducted) Antenna 1: 16.64dBm (Conducted) 5725-5850MHz: Antenna 0: 16.47dBm (Conducted) Antenna 1: 16.42dBm (Conducted)
Type of Modulation:	QPSK, 16QAM, 64QAM, 256QAM, 1024QAM
Type of Antenna:	FPC Antenna
Antenna Gain:	3.1dBi
Wi-Fi (5925-7125MHz)	
Description of categories	LPI client sub-category device
Support Standards:	802.11ax-HE20; 802.11ax-HE40; 802.11ax-HE80; 802.11ax-HE160
RF Output Power	Antenna 1: Max. 15.68dBm (Conducted) Antenna 2: Max. 15.30dBm (Conducted)
Operation Frequency:	5925-6425MHz; 6425-6525MHz 6525-6875MHz; 6875-7125MHz
Modulation:	BPSK, QPSK,16QAM,64QAM, 256QAM,1024QAM
Antenna Type:	FPC Antenna
Antenna Gain:	Antenna : 3.5dBi

1.2 RF Exposure Exemption

According to §1.1307(b)(3) and KDB 447498 D04 Interim General RF Exposure Guidance v01, system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

Option A: FCC Rule Part 1.1307 (b)(3)(i)(A):The available maximum time-averaged power is no more than 1mW, regardless of separation distance.

Option B: FCC Rule Part 1.1307 (b)(3)(i)(B): The available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. P_{th} is given by:

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}}(d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

d = the separation distance (cm);

Option C: FCC Rule Part 1.1307 (b)(3)(i)(C): The minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. R must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters.

Single RF Sources Subject to Routine Environmental Evaluation	
RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R ²
1.34-30	3,450 R ² /f ²
30-300	3.83 R ²
300-1,500	0.0128 R ² f
1,500-100,000	19.2R ²

For Multiple RF sources: FCC Rule Part 1.1307(b)(3)(ii):

- (A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required).
- (B) In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

1.3 Calculated Result

Radio Access Technology	Prediction Frequency (MHz)	Output Power (dBm)	Antenna Gain (dBi)	Duty Cycle (%)	Tune-Up Time-Averaged Power (dBm)	ERP (dBm)
Bluetooth	2402	11.88	3.0	100	12.00	12.85
Wi-Fi Antenna 1	2412	15.41	3.0	100	16.00	16.85
	5260	16.87	3.1	100	17.00	17.95
	6895	15.68	3.5	81.41	15.00	16.35
Wi-Fi Antenna 2	2412	15.36	3.0	100	16.00	16.85
	5180	16.70	3.1	100	17.00	17.95
	6895	15.30	3.5	81.41	15.00	16.35

Frequency (MHz)	Option	Min. Distance	Max. Power		Exposure Limit	Ratio	Result
		(cm)	(dBm)	(mW)	(mW)		Pass/Fail
2402	C	20.00	12.85	19.28	768.00	0.03	Pass
2412	C	20.00	16.85	48.42	768.00	0.06	Pass
5260	C	20.00	17.95	62.37	768.00	0.08	Pass
6895	C	20.00	16.35	43.15	768.00	0.06	Pass
2412	C	20.00	16.85	48.42	768.00	0.06	Pass
5180	C	20.00	17.95	62.37	768.00	0.08	Pass
6895	C	20.00	16.35	43.15	768.00	0.06	Pass

Note: 1. Time-Averaged Power=Output Power * Duty Cycle; ERP= Time-Averaged Power+ Antenna gain-2.15dB

2. Option A, B and C refers as clause 1.2.

3. For option B, Max (time-averaged power, effective radiated power (ERP)) converts to Max. Power. For option C, ERP converts to Max. Power;

4. For option B, P_{th} (mW) converts to Exposure Limit (mW); For option C, ERP (W) converts to Exposure Limit (mW).

5. Ratio= Tune-Up ERP (mW)/ Exposure Limit (mW)

Mode for Simultaneous Multi-band Transmission:

Radio Access Technology	Ratio 1	Ratio 2	Ratio 3	Simultaneous Ratio	Limit	Result
						Pass/Fail
Bluetooth+Wi-Fi Antenna 1+Wi-Fi Antenna 2	0.03	0.08	0.08	0.19	1	Pass

Result: Pass