1. RF Exposure Requirements

1.1 General Information

Client Information

Applicant:	Shenzhen Qiyue Optronics Company Limited
Address of applicant:	Flat3,Tower 3, Excellence Meilin Center Plaza, Zhongkang Road 128, Shangmeilin, Futian District, Shenzhen , China
Manufacturer:	SHENZHEN QIYUE OPTRONICS COMPANY LIMITED BRANCH
Address of manufacturer:	A/B/C/D Building, Xitian Industrial Park, Dashuikeng Community,Guanlan Street, Longhua New District, Shenzhen City, China

General Description of EUT:

Product Name:	50” UHD LED TV
Trade Name:	GOYO
Model No.:	G50Y
Adding Model(s):	D50F115_35-U-A-WH, XXXXXXXX50XXXXXXX(Where “X”can be any alphanumeric of A-Z or 0-9 or blank or -，indicates different client)
Rated Voltage:	AC120V/60Hz
Battery Capacity:	/
Power Adapter:	/
FCC ID:	XOM-G50Y
Equipment Type:	Fixed device

Technical Characteristics of EUT:

Bluetooth (BLE mode)

Bluetooth Version:	V5.0 (BLE mode)
Frequency Range:	2402-2480MHz
RF Output Power:	3.40dBm (Conducted)
Data Rate:	1Mbps
Modulation:	GFSK
Quantity of Channels:	40
Channel Separation:	2MHz
Type of Antenna:	dipole Antenna
Antenna Gain:	2.80dBi

Bluetooth (BR/EDR mode)

Bluetooth Version:	V5.0 (BR/EDR mode)
Frequency Range:	2402-2480MHz
RF Output Power:	5.01dBm (Conducted)
Data Rate:	1Mbps, 2Mbps, 3Mbps
Modulation:	GFSK, π/4 DQPSK, 8DPSK
Quantity of Channels:	79
Channel Separation:	1MHz

Type of Antenna:	dipole Antenna
Antenna Gain:	2.80dBi
Wi-Fi (2.4G)	
Support Standards:	802.11b, 802.11g, 802.11n
Frequency Range:	2412-2462MHz for 802.11b/g/n(HT20) 2422-2452MHz for 802.11n(HT40)
RF Output Power:	Antenna 1:15.45dBm (Conducted) Antenna 2:16.04dBm (Conducted)
Type of Modulation:	CCK, OFDM, QPSK, BPSK, 16QAM, 64QAM
Quantity of Channels:	11 for 802.11b/g/n(HT20); 7 for 802.11n(HT40)
Channel Separation:	5MHz
Type of Antenna:	dipole Antenna
Antenna Gain:	2.57dBi
Wi-Fi (5G)	
Support Standards:	802.11a, 802.11n-HT20, 802.11n-HT40, 802.11ac-VHT20, 802.11ac-VHT40,802.11ac-VHT80
Frequency Range:	5180-5240MHz, 5260-5320MHz 5500-5700MHz, 5745-5825MHz
Max. RF Output Power:	5180-5240MHz: Antenna 1: 15.84dBm (Conducted) Antenna 2: 15.44dBm (Conducted) 5260-5320MHz: Antenna 1: 15.16dBm (Conducted) Antenna 2: 14.38dBm (Conducted) 5500-5700MH: Antenna 1: 15.64dBm (Conducted) Antenna 2: 15.66dBm (Conducted) 5745-5825MHz: Antenna 1: 15.01dBm (Conducted) Antenna 2: 15.23dBm (Conducted)
Type of Modulation:	QPSK, 16QAM, 64QAM,256QAM
Type of Antenna:	dipole Antenna
Antenna Gain:	5180-5240MHz:2.07dBi, 5260-5320MHz:2.25dBi, 5500-5700MHz:2.21dBi, 5745-5825MHz:2.10dBi

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:

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

Where

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

and

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

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 λ/2π, 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^2f
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.

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

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	5.01	2.80	100	6.00	6.65
Wi-Fi(2.4GHz) Antenna 1	2412	15.45	2.57	100	16.00	16.42
Wi-Fi(2.4GHz) Antenna 2	2412	16.04	2.57	100	17.00	17.42
Wi-Fi(5GHz) Antenna 1	5180	15.84	2.07	100	16.00	15.92
Wi-Fi(5GHz) Antenna 2	5180	15.44	2.07	100	16.00	15.92
Wi-Fi(5GHz) Antenna 1	5260	15.16	2.25	100	16.00	16.10
Wi-Fi(5GHz) Antenna 2	5260	14.38	2.25	100	15.00	15.10
Wi-Fi(5GHz) Antenna 1	5500	15.64	2.21	100	16.00	16.06
Wi-Fi(5GHz) Antenna 2	5500	15.66	2.21	100	16.00	16.06
Wi-Fi(5GHz) Antenna 1	5745	15.01	2.10	100	16.00	15.95
Wi-Fi(5GHz) Antenna 2	5745	15.23	2.10	100	16.00	15.95

Frequency (MHz)	Option	Min. Distance (cm)	Max. Power (dBm)	Max. Power (mW)	Exposure Limit (mW)	Ratio	Result Pass/Fail
2402	C	20.00	6.65	4.62	768.00	0.01	Pass
2412	C	20.00	16.42	43.85	768.00	0.06	Pass
2412	C	20.00	17.42	55.21	768.00	0.07	Pass
5180	C	20.00	15.92	39.08	768.00	0.05	Pass
5180	C	20.00	15.92	39.08	768.00	0.05	Pass
5260	C	20.00	16.10	40.74	768.00	0.05	Pass
5260	C	20.00	15.10	32.36	768.00	0.04	Pass
5500	C	20.00	16.06	40.36	768.00	0.05	Pass
5500	C	20.00	16.06	40.36	768.00	0.05	Pass
5745	C	20.00	15.95	39.36	768.00	0.05	Pass
5745	C	20.00	15.95	39.36	768.00	0.05	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
BT + Antenna 1 +Antenna 2	0.01	0.06	0.07	0.14	1	Pass

Result: Pass