

1. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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: 55” SMART 4K UHD TV
Trade Name: RCA, PROSCAN, RCA SCENIUM, TECHNICOLOR, SYLVANIA, RCASMA TVIRTUOSO
Model No.: D55A114-U-A-I
RWOSU5549-B, XXXXXXXXXXXX55XXXXXXXXXXXXXXXXXX
Adding Model(s): (Where “X” can be any alphanumeric of A-Z or 0-9 or blank or -, indicates different client)
Rated Voltage: AC100-120V/60Hz
FCC ID: XOMD55A114-U-A-I
Equipment Type: Mobile

Technical Characteristics of EUT:

Bluetooth

Bluetooth Version: V5.0 (BR/EDR/LE mode)
Frequency Range: 2402-2480MHz
RF Output Power: 10.060dBm (Conducted)
Data Rate: 1Mbps, 2Mbps, 3Mbps
Modulation: GFSK, $\pi/4$ DQPSK, 8DPSK
Quantity of Channels: 79/40
Channel Separation: 1MHz/2MHz
Type of Antenna: Integral Antenna
Antenna Gain: 2dBi

WiFi (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 1:15.55dBm (Conducted)

Antenna 2: 15.30dBm (Conducted)
 Type of Modulation: DBPSK,BPSK,DQPSK,QPSK,16QAM,64QAM
 Quantity of Channels: 11 for 802.11b/g/n(HT20); 7 for 802.11n(HT40)
 Channel Separation: 5MHz
 Type of Antenna: Integral Antenna
 Antenna Gain: 2dBi

WiFi (5G)

Support Standards: 802.11a, 802.11n(HT20), 802.11n-HT40, 802.11ac-HT80
 Frequency Range: 5150-5250MHz, 5725-5850MHz
 RF Output Power: Antenna 1:14.36dBm (Conducted)
 Antenna 2: 14.62dBm (Conducted)
 Type of Modulation: BPSK, QPSK,16QAM,64QAM
 Type of Antenna: Integral Antenna
 Antenna Gain: 2dBi

1.2 Standard Applicable

According to § 1.1307(b)(1) and KDB 447498 D01 General RF Exposure Guidance v06, 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.

(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 Times 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)*	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	F/300	6
1500-100000	/	/	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 Times 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)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-100000	/	/	1	30

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

1.3 MPE Calculation Method

$$S = (30 * P * G) / (377 * R^2)$$

S = power density (in appropriate units, e.g., mw/cm²)

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

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., cm)

1.4 MPE Calculation Result

For Bluetooth

Maximum Tune-Up output power: 11(dBm)

Maximum peak output power at antenna input terminal: 12.59 (mW)

Prediction distance: >20(cm)

Prediction frequency: 2480 (MHz)

Antenna gain: 2.0(dBi)

Directional gain (numeric gain): 1.58

The worst case is power density at prediction frequency at 20cm: 0.0040 (mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

For WiFi (2.4G)

Maximum Tune-Up output power: 16(dBm)

Maximum peak output power at antenna input terminal: 39.81 (mW)

Prediction distance: >20(cm)

Prediction frequency: 2412 (MHz)

Antenna gain: 2.0(dBi)

Directional gain (numeric gain): 1.58

The worst case is power density at prediction frequency at 20cm: 0.0126 (mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

For WiFi (5.2G)

Maximum Tune-Up output power: 17(dBm)

Maximum peak output power at antenna input terminal: 50.12(mW)

Prediction distance: >20(cm)

Prediction frequency: 5230 (MHz)

Antenna gain: 2.0(dBi)

Directional gain (numeric gain): 1.58

The worst case is power density at prediction frequency at 20cm: 0.0158(mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

For WiFi (5.8G)

Maximum Tune-Up output power: 17(dBm)

Maximum peak output power at antenna input terminal: 50.12(mW)

Prediction distance: >20(cm)

Prediction frequency: 5785 (MHz)

Antenna gain: 2.0(dBi)

Directional gain (numeric gain): 1.58

The worst case is power density at prediction frequency at 20cm: 0.0158(mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

Mode for Simultaneous Multi-band Transmission

WiFi (2.4G) and WiFi (5G) is the use the same antenna cannot simultaneous transmission.

Bluetooth + WiFi (2.4G)

The worst case is power density at prediction frequency at 20cm: 0.0040+0.0126=0.0166(mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

Bluetooth + WiFi (5G)

The worst case is power density at prediction frequency at 20cm: 0.0040+0.0158=0.0198(mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

Result: Pass