# 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: | 39’’ SMART HDTV |
| Trade Name | RCA, PROSCAN, RCA SCENIUM, TECHNICOLOR, SYLVANIA, RCASMARTVIRTUOSO |
| Model No.: | D385GA064K-A-I |
| Adding Model(s): | RWOSH3950, XXXXXXXXXX39XXXXXXXXXXXXX (Where “X”can be any alphanumeric of A-Z or 0-9 or blank or -，indicates different client) |
| Rated Voltage: | AC120V/60Hz |
| FCC ID: | XOMD385GA064K-A-I |
| Equipment Type: | Fixed |

**Technical Characteristics of EUT:**

**Bluetooth**

| | |
|---|---|
| Bluetooth Version: | V5.0 (BR/EDR/LE mode) |
| Frequency Range: | 2402-2480MHz |
| RF Output Power: | 8.947dBm (Conducted) |
| Data Rate: | 1Mbps, 2Mbps, 3Mbps |
| Modulation: | GFSK, π/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)<br>2422-2452MHz for 802.11n(HT40) |
| RF Output Power: | Antenna 0: 15.76dBm (Conducted) |

| | |
|---|---|
| | Antenna 1: 16.01dBm (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-VHT80 |
| Frequency Range: | 5150-5250MHz, 5725-5850MHz |
| RF Output Power: | 5150-5250MHz<br>ANT 0:14.93dBm (Conducted)<br>ANT 1: 15.57dBm (Conducted)<br>5725-5850MHz:<br>ANT 0:14.74dBm (Conducted)<br>ANT 1: 15.38dBm (Conducted) |
| Type of Modulation: | BPSK, QPSK, 16QAM, 64QAM, 256QAM |
| 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 equivalents power density

## 1.3 MPE Calculation Method

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

S = power density (in appropriate units, e.g., $mw/cm^2$)

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: 9(dBm)

Maximum peak output power at antenna input terminal: 7.94 (mW)

Prediction distance: >20(cm)

Prediction frequency: 2441 (MHz)

Antenna gain: 2.0(dBi)

Directional gain (numeric gain): 1.58

The worst case is power density at prediction frequency at 20cm: 0.0025 ($mw/cm^2$)

MPE limit for general population exposure at prediction frequency: 1 ($mw/cm^2$)

**For WiFi (2.4G)**

Maximum Tune-Up output power: 17(dBm)

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

Prediction distance: >20(cm)

Prediction frequency: 2472 (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 ($mw/cm^2$)

MPE limit for general population exposure at prediction frequency: 1 ($mw/cm^2$)

**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: 5240 (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($mw/cm^2$)

MPE limit for general population exposure at prediction frequency: 1 ($mw/cm^2$)

**For WiFi (5.8G)**

Maximum Tune-Up output power: 18(dBm)

Maximum peak output power at antenna input terminal: 63.10 (mW)

Prediction distance: >20(cm)

Prediction frequency: 5745 (MHz)

Antenna gain: 2.0(dBi)

Directional gain (numeric gain): 1.58

The worst case is power density at prediction frequency at 20cm: 0.0199 ($mw/cm^2$)

MPE limit for general population exposure at prediction frequency: 1 ($mw/cm^2$)

**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: 0.0025/1+0.0158/1=0.0183 <1

Bluetooth + WiFi (5G)

The worst case is power density at prediction frequency at 20cm: 0.0025/1+0.0199/1=0.0224 <1

Result: Pass