# Radio Frequency Exposure Report

On Behalf of

# SAPPHIRE TECHNOLOGY LIMITED

| | |
|---|---|
| **FCC ID:** | **QPK-EDGEHD4** |
| **Product Description:** | **Mini PC** |
| **Model No.:** | **EDGE HD4** |
| **Supplementary Model:** | **N/A** |
| **Prepared for:** | **SAPPHIRE TECHNOLOGY LIMITED**<br>Unit 1909 – 1919, 19/F., Tower 2, Grand Central Plaza, 138 Shatin Rural Committee Road, Shatin, N.T., Hong Kong |
| **Prepared by:** | **Bontek Compliance Testing Laboratory Ltd**<br>1/F, Block East H-3, OCT Eastern Ind. Zone, Qiaocheng East Road, Nanshan, Shenzhen, China<br>Tel: 86-755-86337020<br>Fax: 86-755-86337028 |
| **Report No.:** | BCT12IR-1746E-2 |
| **Issue Date:** | January 14, 2013 |
| **Test Date:** | January 10~14, 2013 |

**Tested by:** Lion Cai

**Reviewed by:** Kendy Wang

**Approved by:** Tony Wu

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# 1. GENERAL INFORMATION

## 1.1 Product Description for Equipment Under Test (EUT)

Client Information

| | |
|---|---|
| Applicant: | **SAPPHIRE TECHNOLOGY LIMITED** |
| Address of Applicant: | Unit 1909 – 1919, 19/F., Tower 2, Grand Central Plaza, 138 Shatin Rural Committee Road, Shatin, N.T., Hong Kong |
| Manufacturer: | **SAPPHIRE TECHNOLOGY LIMITED** |
| Address of Manufacturer: | Unit 1909 – 1919, 19/F., Tower 2, Grand Central Plaza, 138 Shatin Rural Committee Road, Shatin, N.T., Hong Kong |

**General Description of E.U.T**

| **Items** | **Description** |
|---|---|
| EUT Description: | **Mini PC** |
| Trade Name: | **N/A** |
| Model No.: | **EDGE HD4** |
| Supplementary Model: | N/A |
| Frequency Band: | IEEE 802.11b/g,<br>IEEE 802.11n HT20 (ISM Band) : 2412MHz～2462MHz,<br>IEEE 802.11n HT40 (ISM Band) : 2422MHz～2452MHz |
| Channel Spacing: | IEEE 802.11b/g, 802.11n HT20/HT40: 5MHz |
| Number of Channels: | IEEE 802.11b/g, 802.11n HT20:11 Channels<br>IEEE 802.11n HT40 :7 Channels |
| Transmit Data Rate: | maximum of 300Mbps |
| Type of Modulation: | IEEE 802.11b：DSSS (CCK, DQPSK, DBPSK)<br>IEEE 802.11g：OFDM (64QAM, 16QAM, QPSK, BPSK)<br>IEEE 802.11n HT20/40：OFDM (64QAM, 16QAM, QPSK, BPSK) |
| Antenna Type: | Built-in Antenna |
| Antenna Gain: | 1dB |
| Power Supply: | Input: 19V DC 3.42A |
| Adapter Information: | Model: MN-A065-H190<br>Input:100-240V 1.5A max 50/60Hz<br>Output: 19V DC 3.42A |

** The test data gathered are from the production sample provided by the manufacturer.*

## 1.2 Objective

The objective of the following report is used to demonstrate that EUT operated in a manner that ensures the public is not exposed to radio frequency energy levels in excess of the relative provisions of FCC 47CFR Part 1.1307

## 1.3 General Description of Test

| Items | Description |
|---|---|
| EUT Frequency band | ☐ FHSS: 2.400GHz ~ 2.483GHz<br>☒ WLAN: 2.400GHz ~ 2.483GHz<br>☐ WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz<br>☐ WLAN: 5.745GHz ~ 5825GHz<br>☐Others: _____ |
| Device category | ☐Portable (<20cm separation)<br>☒Mobile (>20cm separation)<br>☐Others _____ |
| Exposure classification | ☐Occupational/Controlled exposure (S = 5mW/cm2)<br>☒General Population/Uncontrolled exposure (S=1mW/cm$^2$)<br>☐Others: _____ |
| Antenna diversity | ☒Single antenna<br>☐Multiple antennas:<br>☐Tx diversity<br>☐Rx diversity<br>☐Tx/Rx diversity |
| Max. output power | 15.49dBm (0.0354W) |
| Antenna gain (Max) | 1 dBi (Numeric gain:10) |
| Evaluation applied | ☒MPE Evaluation<br>☐SAR Evaluation |
| ***Note:***<br>*1. The maximum output power is 15.49dBm (0.0354W) at 2437MHz B MODE (with 10 numeric antenna gain.)*<br>*2. For mobile or fixed location transmitters, no SAR consideration applied. The minimum separation generally be used is at least 20 cm, even if the calculations indicate that the MPE distance would be lesser.* | |

## 1.4 Human Exposure Assessment Results

**Calculation**

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{3770}$

*Where* $E$ = *Field Strength in Volts / meter*
$P$ = *Power in Watts*
$G$=*Numeric antenna gain*
$d$=*Distance in meters*
$S$=*Power Density in milliwatts / square centimeter*

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770 d^2}$$

Changing to units of mW and cm, using:

*P (mW) = P (W) / 1000 and*
*d (cm) =100 * d (m)*

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$ ***Equation 1***

*Where* $d$ = *distance in cm*
$P$ = *Power in mW*
$G$ = *Numeric antenna gain*
$S$ = *Power Density in* $mW / cm^2$

| ***EUT parameter (data from the separate report)*** | |
|---|---|
| Given<br>$E=\frac{\sqrt{30\times P\times G}}{d}$ & $S=\frac{E^2}{3770}$ | Where<br>G: numerical gain of transmitting antenna;<br>TP: Transmitted power in watt;<br>d: distance from the transmitting antenna in meter |
| Max average output power in Watt (TP) | 15.49dBm (0.0354W) |
| Antenna gain (G) | 1dBi (Numeric gain: 10) |
| Minimum distance in meter (d)<br>(from transmitting structure to the human body) | 20cm (0.2m) |
| Yields<br>E =16.29V/m<br>S=0.0704mW/cm$^2$ | |
| Conclusion:<br>S=0.0704mW/cm2 is significant lower than the 1mW/cm2<br>(For mobile or fixed location transmitters, the maximum power density is 1.0 mW / cm2 even if the calculation indicates that the power density would be larger.) | |