MPE Analysis Report

The Equipment Under Test (EUT) is the Internet Music System (Model: ACS3101E). The EUT contains two portions: The Tablet portion that using Android Operating System and the Main Unit portion. These two portions are as a whole product unit for sale that cannot be separated by end-user as declared by applicant.

The Tablet portion equipped with a 7-inch LCD display (with touch screen), USB, SD, HDMI interface and audio line output. The Tablet contains a WiFi module and a Bluetooth module. The WiFi module is complying with IEEE 802.11b/g/n(HT20)/n(HT40) standards that operating in 2.4GHz ISM frequency band (2400MHz – 2483.5MHz), while the Bluetooth module is operating in the frequency range from 2402MHz to 2480MHz (79 channels with 1MHz channel spacing). The Tablet is powered by a 5VDC output from the Main Unit. The Main Unit can accept 100-120VAC only. The Bluetooth module of the Tablet is using non-adaptive frequency hopping as declared by the applicant. The USB interface of the Tablet contains PC Connectivity function.

The Main Unit portion of the Internet Music System acts as the undetachable docking base of the Tablet with audio amplification. The Main Unit can accept audio input sources such as 3.5mm phone-jack line-in, FM radio, CD, audio line output from Tablet (Internet) and wireless Bluetooth devices. The Bluetooth module in the Main Unit is operating in the frequency range from 2402MHz to 2480MHz (79 channels with 1MHz channel spacing). The audio signal is amplified and fed to headphone and the separate passive stereo loudspeakers. The Main Unit can accept 100-120VAC only. The Bluetooth module of the Main Unit is using non-adaptive frequency hopping as declared by the applicant.

Main Unit Bluetooth

For the Main Unit Bluetooth:
Antenna Type: Internal, integral
Antenna Gain: 0dBi
Nominal rated field strength: 98.8dBμV/m at 3m
Maximum allowed field strength of production tolerance: +/- 3dB

Tablet Bluetooth

For the Tablet Bluetooth:
Antenna Type: Internal, integral
Antenna Gain: 0dBi
Nominal rated field strength: 100.8dBμV/m at 3m
Maximum allowed field strength of production tolerance: +/- 3dB

Tablet WiFi module

The Tablet WiFi modules was tested in according with the following power output and in actual application the below limit shall not be exceeded.

Operating Mode	Nominal Radiated Field Strength	Production Tolerance
802.11b	85.6dBμV/m at 3m	±3dB
802.11g	79.6dBμV/m at 3m	±3dB
802.11n (HT20)	79.4dBμV/m at 3m	±3dB
802.11n (HT40)	78.6dBμV/m at 3m	±3dB

An internal, integral antenna has been used.
Antenna Gain: 0dBi

FCC ID: A2HRCS13101T
IC: 9903A-RCS13101T

For Maximum Permissible Exposure (MPE) evaluation of the Internet Music System, the maximum power density at 20 cm from this mobile transmitter shall be less than the General Population / Uncontrolled MPE limit in OET Bulletin 65.

1) For the Main Unit Bluetooth of Internet Music System, maximum field strength measured (FS) was 101.8 dBμV/m. The distance (D) between the antenna and the equipment under test (EUT) was 3 meters. And the maximum source-based time-averaging duty factor is 100%. From these data, the exposed power density at a distance (R) of 20cm from the center of radiation of the antenna can be calculated according to OET Bulletin 65 as follow:

The radiated power = (FS*D)^2 / 30 = 4.54 mW

The radiated (EIRP) source-based time-averaging output power
= (4.54 * 1) mW
= 4.54 mW

The power density at 20 cm from the antenna
= EIRP / 4πR^2
= 0.000903 mW cm-2

2) For the Tablet Bluetooth of Internet Music System, maximum field strength measured (FS) was 103.8 dBμV/m. The distance (D) between the antenna and the equipment under test (EUT) was 3 meters. And the maximum source-based time-averaging duty factor is 100%. From these data, the exposed power density at a distance (R) of 20cm from the center of radiation of the antenna can be calculated according to OET Bulletin 65 as follow:

The radiated power = (FS*D)^2 / 30 = 7.20 mW

The radiated (EIRP) source-based time-averaging output power
= (7.20 * 1) mW
= 7.20 mW

The power density at 20 cm from the antenna
= EIRP / 4πR^2
= 0.00143 mW cm-2

3) For the Tablet WiFi module of Internet Music System, maximum field strength measured (FS) was 88.6 dBμV/m. The distance (D) between the antenna and the equipment under test (EUT) was 3 meters. And the maximum source-based time-averaging duty factor is 100%. From these data, the exposed power density at a distance (R) of 20cm from the center of radiation of the antenna can be calculated according to OET Bulletin 65 as follow:

The radiated power = (FS*D)^2 / 30 = 0.217 mW

The radiated (EIRP) source-based time-averaging output power
= (0.217 * 1) mW
= 0.217 mW

The power density at 20 cm from the antenna
= EIRP / 4πR^2
= 0.0000432 mW cm-2

In the frequency range of 1,500 - 100,000MHz, the MPE limit is 1.0 mWcm-2 for general population and uncontrolled exposure. As the measured power density at 20cm from the transmitter is lower than the MPE limit, the compliance to the MPE limit can be ensured by indicating the minimum 20cm separation between the transmitter's radiating structures and body of the user or nearby persons.
The following RF exposure statement is proposed to be included in the user manual:

“ FCC RF Radiation Exposure Statement
Caution: To maintain compliance with the FCC’s RF exposure guidelines, place the Internet Music System at least 20cm from nearby persons.”

In addition, for this product with multiple transmitter and antenna (Main Unit Bluetooth, Tablet Bluetooth and Tablet WiFi), the requirement of Simultaneous Transmission evaluation has also been considered and has complied with the following conditions of the worse case;

MPE1/Limit1 + MPE2/Limit2 + MPE3/Limit3 $\leq$ 1

Thus,

0.000903 /1	+	0.00143/1	+	0.0000432/1	=	0.0024
Main Unit Bluetooth		Tablet Bluetooth		Tablet WiFi module		

It is concluded that no Simultaneous Transmission evaluation is required.