Exhibit: RF Exposure – FCC

Colocation of NFC + Certified Module

FCC ID: 2AYVDALTO
IC: 27039-ALTO

Contains Certified Module:
FCC ID: RYK-WPEQ261ACNIBT
IC: 6158A-EQ261ACNIBT

Report File #: 7169009718R-MPE-000

RF Exposure – FCC

The device is a mobile device intended to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure and the body of the user or nearby persons. The unit is considered a mobile device.

The EUT is an RFID NFC transmitter operating at 13.56 MHz.

The EUT contains a certified transmitter module with WiFi and BT (Bluetooth) capabilities operating at 2.4 GHz and 5 GHz.

The NFC can operate simultaneously with the WiFi/BT module.
The WiFi/BT module can operate with either 2.4 GHz WiFi + BT, or 5 GHz WiFi + BT.

Simultaneous operation of the transmitters is possible. Therefore, antenna co-location testing is also evaluated.

Radio Frequency Exposure Evaluation: Mobile Devices

Mobile devices shall be evaluated for RF radiation exposure according to the provisions of FCC 2.1091 and the MPE guidelines identified in FCC 1.1310.

As per FCC §1.1310 Table 1(ii), the limit for Maximum Permissible Exposure (MPE) for radiofrequency electromagnetic fields for General Population/Uncontrolled Exposure is the following:

NFC Transmitter

In the frequency range of 1.34 to 30 MHz: **$180/f^2$ mW/cm^2**
Where f = frequency in MHz.

WiFi Transmitter

In the frequency range of 1500 MHz to 100 GHz: **1.0 mW/cm^2**.

Therefore, the limits for this device are as follows:

MPE Limits		
Transmitter	**Frequency**	**Limit**
NFC	13.56 MHz	0.979 mW/cm^2
BT	2.4 GHz	1.0 mW/cm2
WiFi	2.4 GHz, 5 GHz	1.0 mW/cm2

The power density formula is given by:

$$P_d = (EIRP) / (4\pi R^2)$$

Where,
P_d = Power density in mW/cm^2
EIRP = Equivalent Isotropic Radiated Power = (Output Power)*(Antenna Gain)
π = 3.1416
R = Separation distance in cm

MPE of 13.56MHz Transmitter

The 13.56MHz transmitter has a maximum radiated output power of 51.83 dBµV (at 3m) which equals to an EIRP of (51.83 – 95.2) = -43.37 dBm or 0.00004603 mW.
For a distance of 20 cm, the power density is:

$$P_d = (0.00004603 \text{ mW}) / (4 * 3.1416 * (20\text{cm})^2)$$

$$\mathbf{P_d = 0.00000000916 \text{ mW/cm}^2}$$

The device passes the requirement. The calculated power density of 0.00000000916 mW/cm^2 is below the 0.979 mW/cm^2 limit.

MPE of WiFi Transmitter

Per its FCC filing documents, at a 20 cm distance:

The 2.4 GHz WiFi transmitter has a max power density of:

$$\mathbf{P_d = 0.088\ mW/cm^2}$$

The 5 GHz WiFi transmitter has a max power density of:

$$\mathbf{P_d = 0.076\ mW/cm^2}$$

MPE of BT Transmitter

Per its FCC filing documents, at a 20 cm distance:

The BT transmitter has a max power density of:

$$\mathbf{P_d = 0.001\ mW/cm^2}$$

Calculations for Simultaneous Transmission Device

As per FCC KDB447498 7.2:

> *Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0.*

MPE ratio = Ratio of power density to MPE limit at the test frequency = P_d / (MPE limit)

MPE ratio for NFC transmitter

= 0.00000000916 mW/cm^2 / 0.979 mW/cm^2 = **0.00000000936**

MPE ratio for 2.4 GHz WiFi transmitter

= 0.088 mW/cm^2 / 1 mW/cm^2 = **0.088**

MPE ratio for 5 GHz WiFi transmitter

= 0.076 mW/cm^2 / 1 mW/cm^2 = **0.076**

MPE ratio for 2.4 GHz BT transmitter

= 0.001 mW/cm^2 / 1 mW/cm^2 = **0.001**

Sum of MPE ratios for NFC + 2.4 GHz WiFi + 2.4 GHz BT

= 0.00000000936 + 0.088 + 0.001 = **0.08900001 < 1.0**

Sum of MPE ratios for NFC + 5 GHz WiFi + 2.4 GHz BT

= 0.00000000936 + 0.076 + 0.001 = **0.07700001 < 1.0**

Result

MPE test exclusion applies for all simultaneous transmission configurations.