Radiation Hazard Assessment

Date	11th October 2022
FCC ID	UAUSLX
Brand Name	TSL
Model Number Tested	Extra (TSL-EXTRA-RK-HL)
Product	Proximity Card Reader with Bluetooth
Manufacturer	Integrated Control Technology Ltd. (ICT)
Country of Origin	New Zealand
Serial Number	Not Serialised

Product Description:

The TSL Reader is a dual mode Proximity Card Reader that has transmitters operating on 125 kHz and 13.560 MHz

In addition it contains a Bluetooth module that operates in the 2.4 GHz which enables the device to be configured and connected with the outside world.

When tested it appeared that all three transmitters were transmitting simultaneously.

In reality each transmitter is operated in a sequence with only a single transmitting device operating at any one time.

FCC part 15 testing as detailed in EMC Technologies NZ Ltd test report number 220704.1 dated 26 August 2022 shows that each of these transmitters comply with the field strength limits contained with FCC Part 15 sections 15.209, 15.225 and 15.249.

As per FCC KDB 447498 D01 v06 and Section 2.1091 radio frequency transmitters are required to be operated in a manner that ensures the public is not exposed to RF energy levels.

Calculations have been made using the General Public/Uncontrolled Exposure limits that are defined in Section 1.1310.

While the transmitters in this device can come in close contact with the human body (the hand) when cards are placed in or near the device when a transaction is carried, for most of the time a distance of 20 cm from the device to the body can be maintained for nominal usage.

As transmissions occur in a sequence MPE calculations have been made to ensure that each transmitter meets the 20 cm requirement at the frequency of operation based upon the radiated field strength measurements in the test report detailed above.

For an Uncontrolled Environment (125 kHz)

No limit is specified at 125 kHz with limits commencing at 300 kHz

The limit at 300 kHz of 100 mW/cm^2 has therefore been applied

Power Density = 100 mW/cm^2
E= √100 * 3770
E = 614 V/m

125 kHz transmitter with a field strength of 73.0 dBuV/m (Peak detector) at a test distance of 10 metres.

This equates to a radiated power of -11.8 dBm which is the same as 0.067 mW

The calculation is as follows:

FS = (√ (30 * P)) / D

Therefore

D = (√ (30 * P * G * DC)) / FS

D = (√ (30 * 0.067 mW)) / 614

d= 0.00007 metres or 0.007 cm

For an Uncontrolled Environment (13.560 MHz)

The limit at 13.560 MHz of 0.979 mW/cm^2 has been applied

Power Density = 0.979 mW/cm^2
E= √0.979 * 3770
E = 60.7 V/m

13.560 MHz transmitter with a field strength of 45.6 dBuV/m (Quasi Peak detector) at a test distance of 10 metres

This equates to a radiated power of -39.2 dBm which is the same as 0.0001 mW

The calculation is as follows:

FS = (√ (30 * P)) / D

Therefore

D = (√ (30 * P * G * DC)) / FS

D = (√ (30 * 0.0001 mW)) / 60.7

d= 0.00003 metres or 0.003 cm

For an Uncontrolled Environment (Bluetooth)

The limit at 2.4 GHz of 1.0 mW/cm^2 has been applied

Power Density = 1.0 mW/cm^2
E= √1.0 * 3770
E = 61.4 V/m

2.4 GHz Bluetooth transmitter with a field strength of 88.9 dBuV/m (Peak) at a test distance of 3 metres.

This equates to a radiated power of -6.3 dBm which is the same as 0.233 mW

The calculation is as follows:

FS = (√ (30 * P)) / D

Therefore

D = (√ (30 * P * G * DC)) / FS

D = (√ (30 * 0.233 mW)) / 61.4

d= 0.0014 metres or 0.14 cm

Result: Complies if a safe distance of at least 20 cm is applied to this device when it is used in an uncontrolled environment.