



## CTC Laboratories, Inc.

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# Maximum Permissible Exposure Evaluation

FCC ID: 2A3AB-UNO5

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) Radiation as specified in §1.1307(b)

### EUT Specification

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Name:              | LCD PROJECTOR                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Trade Mark:                | COI                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Model/Type reference:      | Q1                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Listed Model(s):           | Uno5, Q1 PRO                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Frequency band (Operating) | <input checked="" type="checkbox"/> BT: 2.402GHz ~ 2.480GHz<br><input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz<br><input checked="" type="checkbox"/> RLAN: 5.150GHz ~ 5.250GHz<br><input checked="" type="checkbox"/> RLAN: 5.250GHz ~ 5.350GHz<br><input checked="" type="checkbox"/> RLAN: 5.470GHz ~ 5.725GHz<br><input checked="" type="checkbox"/> RLAN: 5.725GHz ~ 5.850GHz<br><input type="checkbox"/> Others |
| Device category            | <input type="checkbox"/> Portable (<5mm separation)<br><input type="checkbox"/> Mobile (>20cm separation)<br><input checked="" type="checkbox"/> Fixed (>20cm separation)<br><input type="checkbox"/> Others                                                                                                                                                                                                                        |
| Exposure classification    | <input type="checkbox"/> Occupational/Controlled exposure (S=5mW/cm <sup>2</sup> )<br><input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm <sup>2</sup> )                                                                                                                                                                                                                                         |
| Antenna diversity          | <input type="checkbox"/> Single antenna<br><input checked="" type="checkbox"/> Multiple antenna<br><input type="checkbox"/> Tx diversity<br><input type="checkbox"/> Rx diversity<br><input type="checkbox"/> Tx/Rx diversity                                                                                                                                                                                                       |
| Antenna gain (Max)         | BT ANT: 2.68dBi<br>2.4G WIFI ANT1: 3.89dBi, ANT2: 4.02dBi, Directional gain: 6.97dBi<br>5G WIFI ANT1: 3.90dBi, ANT2: 3.87dBi, Directional gain: 6.90dBi                                                                                                                                                                                                                                                                             |
| Evaluation applied         | <input checked="" type="checkbox"/> MPE Evaluation<br><input type="checkbox"/> SAR Evaluation                                                                                                                                                                                                                                                                                                                                       |

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**Limits for Maximum Permissible Exposure (MPE)**

| Frequency Range(MHz)                                  | Electric Field Strength(V/m) | Magnetic Field Strength(A/m) | Power Density(mW/cm <sup>2</sup> ) | Average Time |
|-------------------------------------------------------|------------------------------|------------------------------|------------------------------------|--------------|
| (A) Limits for Occupational/Control Exposures         |                              |                              |                                    |              |
| 300-1500                                              | --                           | --                           | F/300                              | 6            |
| 1500-100000                                           | --                           | --                           | 5                                  | 6            |
| (B) Limits for General Population/Uncontrol Exposures |                              |                              |                                    |              |
| 300-1500                                              | --                           | --                           | F/1500                             | 6            |
| 1500-100000                                           | --                           | --                           | 1                                  | 30           |

Friis transmission formula:  $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

$P_d$  = Power density in mW/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

$G$  = gain of antenna in linear scale

$\pi$  = 3.1416

$R$  = distance between observation point and center of the radiator in cm

$P_d$  the limit of MPE 1mW/cm<sup>2</sup>. If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

**Measurement Result**

*Only show the value of the worst antenna.*

| BLE - Worst case |                         |                           |                          |                    |                                             |                                            |
|------------------|-------------------------|---------------------------|--------------------------|--------------------|---------------------------------------------|--------------------------------------------|
| Type             | Channel Frequency (MHz) | Max. Measured Power (dBm) | Max. Tune up Power (dBm) | Antenna Gain (dBi) | Power density at 20cm (mW/cm <sup>2</sup> ) | Power density Limits (mW/cm <sup>2</sup> ) |
| GFSK             | 2402                    | 6.10                      | 6.50                     | 2.68               | 0.0016                                      | 1                                          |

| EDR - Worst case |                         |                           |                          |                    |                                             |                                            |
|------------------|-------------------------|---------------------------|--------------------------|--------------------|---------------------------------------------|--------------------------------------------|
| Type             | Channel Frequency (MHz) | Max. Measured Power (dBm) | Max. Tune up Power (dBm) | Antenna Gain (dBi) | Power density at 20cm (mW/cm <sup>2</sup> ) | Power density Limits (mW/cm <sup>2</sup> ) |
| 8-DPSK           | 2402                    | 8.15                      | 8.50                     | 2.68               | 0.0026                                      | 1                                          |

| 2.4G WIFI - Worst case |                         |                           |                          |                    |                                             |                                            |
|------------------------|-------------------------|---------------------------|--------------------------|--------------------|---------------------------------------------|--------------------------------------------|
| Type                   | Channel Frequency (MHz) | Max. Measured Power (dBm) | Max. Tune up Power (dBm) | Antenna Gain (dBi) | Power density at 20cm (mW/cm <sup>2</sup> ) | Power density Limits (mW/cm <sup>2</sup> ) |
| 802.11 N20             | 2462                    | 18.81                     | 19.00                    | 6.97               | 0.0787                                      | 1                                          |



| 5G WIFI - Worst case |                         |                           |                          |                    |                                             |                                            |
|----------------------|-------------------------|---------------------------|--------------------------|--------------------|---------------------------------------------|--------------------------------------------|
| Type                 | Channel Frequency (MHz) | Max. Measured Power (dBm) | Max. Tune up Power (dBm) | Antenna Gain (dBi) | Power density at 20cm (mW/cm <sup>2</sup> ) | Power density Limits (mW/cm <sup>2</sup> ) |
| 802.11 AC40          | 5510                    | 19.24                     | 19.50                    | 6.90               | 0.0868                                      | 1                                          |

The BT and WIFI can transmit simultaneously.

| Worst case  |                         |                    |                                             |                                                     |                                            |
|-------------|-------------------------|--------------------|---------------------------------------------|-----------------------------------------------------|--------------------------------------------|
| Type        | Channel Frequency (MHz) | Antenna Gain (dBi) | Power density at 20cm (mW/cm <sup>2</sup> ) | BT+WIFI Power density at 20cm (mW/cm <sup>2</sup> ) | Power density Limits (mW/cm <sup>2</sup> ) |
| 8-DPSK      | 2402                    | 2.68               | 0.0026                                      | 0.1681                                              | 1                                          |
| 802.11 N20  | 2462                    | 6.97               | 0.0787                                      |                                                     |                                            |
| 802.11 AC40 | 5510                    | 6.90               | 0.0868                                      |                                                     |                                            |

Note:

1. Calculate by Worst-case mode
2. Max. Tune Up Power by Manufacturer's Declaration, and Max. Tune Up Power is used to calculate.
3. For a more detailed features description, please refer to the RF Test Report.

\*\*\*\*\*THE END\*\*\*\*\*