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Viareggio February 13th, 2017

Object: SAR testing clarifications

Correspondence Reference Number: 372105
Form 731 Confirmation Number: TC354100
Date of Original E-mail: 01/27/2017

FCC ID: UVECAENRFID017

1. *Please provide antenna description and location.*

   The antenna is a linearly polarized loop with -3dBi gain.
   In the following pictures the antenna location is shown.

Fig. 1: Antenna location on PCB

Fig. 2: Antenna location seen from device top side

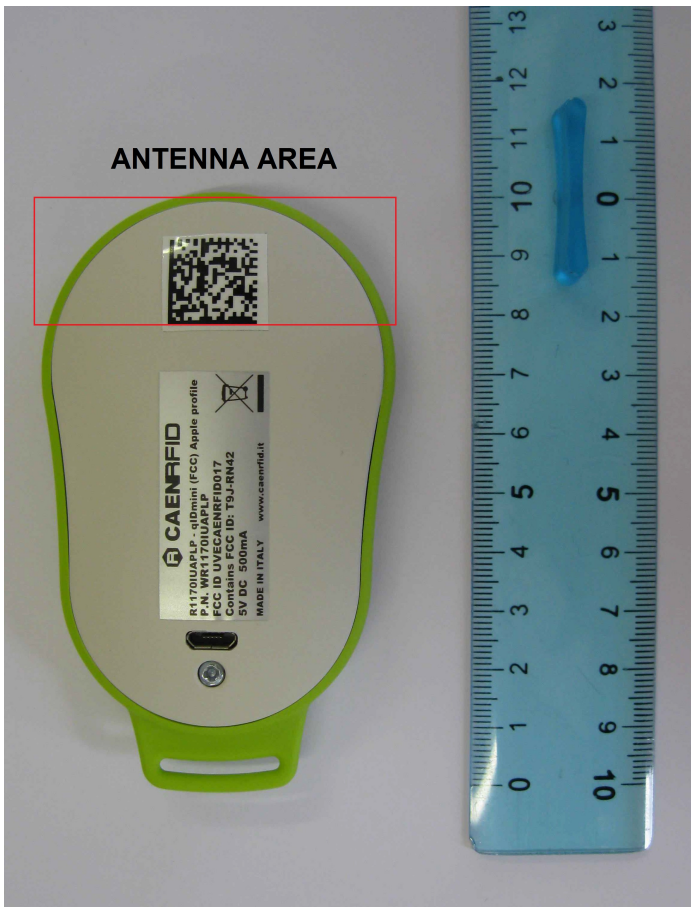

Fig. 3: Antenna location seen from device bottom side

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Fig. 4: Antenna location, internal view from top side (antenna trace is on bottom side)

The drawing in Fig. 5 shows antenna distance from the external surface of device's enclosure.

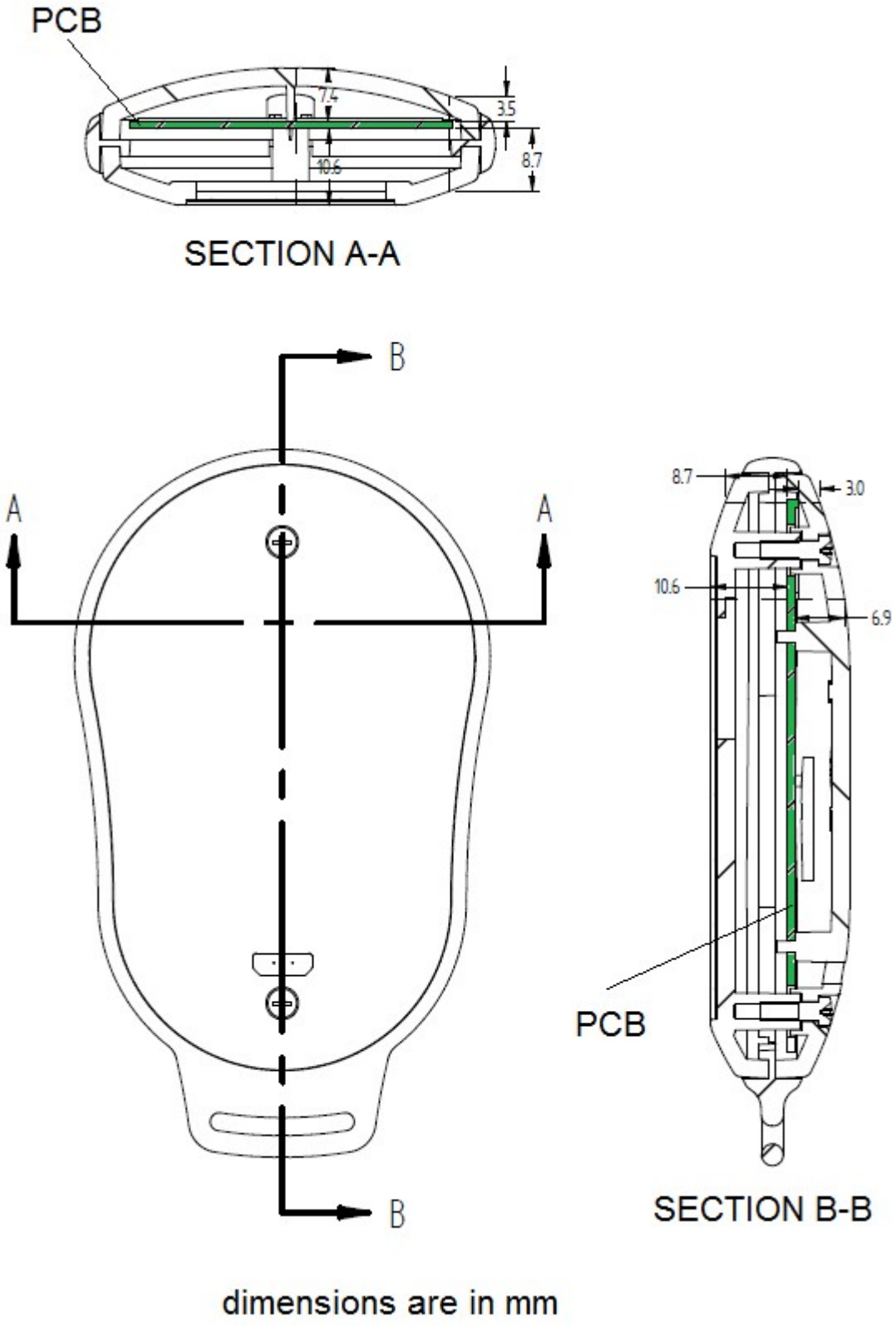

Fig. 5: Antenna distance from enclosure

2. *Evaluation for SAR test exclusion should be done at 5mm test distance. However, SAR testing at 5mm is not enough. Testing should be done at a realistic distance to the body, not to exceed 5mm. Measurement at 3 mm should be sufficient. See KDB Publication 447498 D01 Section 4.2.2c.*

   SAR test exclusion was done at 25mm since the distance between fingers and antenna is greater than 25mm in the typical use when the device is held in operator's hand.
   Even if there is no way to prevent the user to touch the device in the antenna zone having a distance less than 25mm, it shall be considered that in such condition the reading performances of RFID device are strongly degraded and so it is unlikely that an user will use the product in such way.

Fig. 6: Typical usage

Fig. 7: Improper usage (performances are degraded)

   However if it is not acceptable to evaluate SAR test exclusion only in the typical usage configuration but also in improper conditions, the 5mm distance shall be considered and the SAR exclusion threshold is exceeded. For this reason we provide SAR measurements at 5mm distance.
   Regarding the request to reduce the SAR measurements distance at 3mm it shall be considered that, according to what is said above, the device is intended for use on extremities or mainly operated in extremity only. Even if there is no way to prevent the device to transmit when it is worn using a lanyard accessory, in such condition the reading performances of RFID device are strongly degraded and so it is unlikely that an user will use the product in such way. The lanyard is intended to be used to bring the device when it is in stand-by mode and not when the operator wants to transmit for tag's reading.
   We will provide an updated user manual with a warning for the user about this point.

3. *Please explain how the duty cycle of 30.88% was calculated. Keep in mind this needs to be source- based.*

   The device transmits a pulse with duration of about 31.5ms and waits for about 68.5ms before transmitting a new pulse on the next RF channel according to the hopping frequency table, within 20s period 4 pulses are transmitted on each RF channel.
   Since a jitter may occur in the pulse duration, the 30.88% value has been calculated as average value according to the measurements of average time of occupancy at page 47 of test report.
   Please see below calculation details:

   Ch0 average time of occupancy = 122.8ms
   Ch25 average time of occupancy = 121.5ms
   Ch49 average time of occupancy = 126.3ms

   The average duration of the transmission is calculated as (122.8+121.5+126.3)/3 = 123.5ms.
   Within 20s period the overall duration of the transmission is obtained by multiplying the average time of occupancy by the number of channels: 123.5ms x 50 = 6.175s.
   The duty cycle of the transmission is calculated as 6.175 / 20 = 30.88%.

4. *Page 7 of the "Technical Information Manual" describes a 'trigger' button. Can you please explain what happens in this inventory mode? How long is this transmission? Once triggered, no further action is needed by the user, i.e. the device will do its thing while, for example, hanging around user's neck using a lanyard? Is this a continuous transmission? We need to better understand this function.*

   Device transmission can be triggered in the following modes:

   a) Via software
      The user send the reading start command via a program installed on a host device (i.e. a smartphone, a tablet or a PC). The device will transmit continuously with the duty cycle reported at point 3) and it will stop the transmission when the user selects such option on the app installed on the controller device.

   b) Via push-button
      The device is normally in stand-by mode (no RF transmission). When the user press and release the trigger button one or two pulses of 31.5ms nominal duration are transmitted (the second pulse is transmitted only if during the first one the reader has been able to detect the presence of the tag but has not succeeded to read correctly its data).
      Assuming that the user presses the trigger button every 1s, the duty cycle in this condition is about 6%.

5. *The high drift can probably be resolved by testing at a lower power. We note that the device is capable of operating at a lower power, for example 200mW. If at this power level, the SAR drift is within the limits, you can scale up the results.*

   We will provide the result in the updated test report.

6. *Please re-test the back and then front using worst case channel first, followed by the other two channels.*

   We will provide the result in the updated test report.

7. *Page 7 of the "Technical Information Manual" has a warning statement about the setting of RF parameters. How are these set?*

   The meaning of the warning statement is that the customer have to take care to use the device only in the country where it is allowed to be used (i.e. he cannot use the FCC model in Europe or vice versa). Device's operating band is factory set and the user is not able to change it since such settings are inside a password protected area of device's configuration memory.