RF Exposure Requirements

Product Description: FREEDOM-WATCH
Model No.: FREEDOM-WATCH001
FCC ID: XYALOK8UFRWATCH
Tracking Number: 697368

--OET response sent on Nov 22 2011 9:19AM--

For a 0.00047% duty cycle, indeed SAR may be excluded. However, this exclusion is conditioned on the GPRS module has no other operation mode and the 433 MHz module also qualifies for low duty cycle exclusion and no simultaneous transmission issue. Note that low duty cycle is a PBA item (KDB 388624), i.e., TCB needs to consult with FCC before granting.

However, the main concern with this product concept may not be the SAR. The Sierra 850/1900 MHz transmitter module is granted with conditions including for fixed/mobile use only (and 20 cm separation from human body) and not to be co-located with other transmitter. Therefore, either the Sierra module has to apply for a C2PC to be incorporated into this host or the wrist watch should be tested without re-using the module's grant (and FCC ID) and test data.

--OET response sent on Nov 23 2011 9:21AM--
SAR test can be excluded due to low duty factor for a device as described. A TCB PBA is necessary per KDB 388624. Provide justification in lieu of SAR report in the submission and quote this KDB.

However, this reviewer is concerned with whether the device can qualify as an unlicensed Part 15 device under 15.231. The applicant should review 15.231 and make sure compliance of the usage, field strength, transmission pattern and other applicable limitations. User's manual is an important document in our evaluation but we also look at the design and other document.

Operational Description

Freedom consists of a wrist worn location device and a Base station, these are linked via 433 RF technology. It utilises GPS/GSM and RF technology, all of which are modular within the device.

GPS (within watch)– eRide miniRide Opus one 32 channel GPS/AGPS receiver Module. This is used to locate the device.

GSM(within Watch) – Wavecom WMP100 Quad band modem. The device utilises an antenna mounted within the strap of the watch. See below picture, it shows the antenna mounted within a modelled clear version of strap.

RF (within Watch and Base Station) – Microchip MRF49XA transceiver. .

The antenna for GPS is a Sarantel Geo helix P3 design. GSM antenna is our own quad band design. The watch has an RF antenna mounted within the watch strap, whereas the Base Station uses coil a antenna.

Modes

In standard mode the watch and Base station are in communication using the 433 radio link. At this point the GSM is switched off. The watch send a small data packet via the RF every 30 seconds to make sure the devices stay in range. If the watch goes out of range from the Base station then the GSM will turn on and make a connection to our server. It will send out a position and then go to idle to conserve the battery life. The watch will return to RF mode once it has contact with the base station.

The RF has 3 different ranges and these are all varied by varying the power output from the MRF49XA in software ranging from 0.01mW to 1mW. 0dB full power -10.dB for medium and -17.dB for low power.

GSM Idle Mode – This is used if the device is outside of RF range and needs to be located, it will stay in this mode until the battery has been consumed or turned off. In idle mode the device operates in GPRS packet mode only, this allows the device to stay registered with the network and the carrier does not remain on.

Functions if the RF is off.

WRU – This allows the device to be located, on receiving the command it will carry out a GPS lookup and report back its position to the server and then return to idle mode. When sending a position we are sending 21 bytes of data which fits within a single GPRS time slot of 570 microseconds.

Live Track – In live track the device can be configured to automatically return a position every 2, 5, 10, 15 or 30 minutes. The data transmitted is exactly the same as a WRU request, except the device carries it out automatically. The time period between position lookup the device returns to idle mode.

Acorrding to the above operational description and the KDB-447498, the following RF exposure evaluation shall to demonstrate RF exposure compliance:

Duty Cycle Calculation Based on Average Time Power:

RF433:

one pulse is transmission in the 32 seconds period

Duty cycle = 15.25 milliseconds / 32 seconds = 0.00048

Maximum field strength of fundamental: 80.06dBuV/m at 3m distance

The transmitter has a very low power and duty cycle in the RF433 mode, fulilled the RF exposure requirement.

GPRS:

1 single slot is used in the entire 120 seconds period or 1 slot in 210526 slots.

Duty cycle = 570 microseconds /120 seconds = 0.0000047

Average Power in transmission = 2 watts (worst-case average power from WMP100 module) * 0.0000047

=0.000094 watts

In addition, the GPRS function is operated under LT (live track) mode, and the 433.92MHz is operated under RF mode, they can not be used at the same time, therefore, no simultaneous transmission.

Because of the extremely low duty factor and the source-based time -averaged output power is less than 60/f (GHz) for GPRS mode,

Therefore, the transmitter complies with the RF exposure requirements and the SAR is not required.