

FCC RF Exposure Information Per KDB Inquiry Tracking Number 360152

Operational Description

This device is used for fare collection on mass transportation vehicles (e.g. city buses).

Fares are collected via one of two methods; an internal barcode scanner or Near Field Communications module. The device is typically mounted near the door of the vehicle. When passengers board the vehicle they present either a barcode (e.g. printed paper ticket) or Smartcard to the front viewing aperture of the device.

During most operation time the device is greater than 20cm from the passengers and driver. When fares are being collected a passenger typically presents their barcode or Smartcard (and therefore their hand) to within 5cm of the device.

The device has two transmitters. A Wi-Fi module with a PCB mount antenna, and a Near Field Communications module with an antenna mounted around the perimeter of the front viewing aperture.

The device is mounted in the vehicle to the side of the traveled pathway. The validator is mounted per ADA specification and is mounted adjacent to the traveled path of the rider, typically a minimum of 12" exists between the bus driver.

Duty Cycle Correction

The typical transit specifications allow for a 300 ms read and no more than a 750 ms write time for smart card and barcode validation. Rounding up and adding a 1 second dwell time, the rider's hand is within the 5cm range for no more than 2 seconds per use. Assuming a rider uses transit on a typical 2 leg trip per day, the exposure per day = 2 taps * 2 seconds / tap * 2 trips/day = 8 seconds per day.

In a six minute interval, the duty cycle is calculated as followed:

$$8 / (6 \times 60) = 0.022$$

RF Exposure Conditions

The On-Board Validator is intended for operation in the general population in an uncontrolled RF exposed environment.

Antenna Separation Distances

39 mm from Wi-Fi antenna to hand

Transmission Mode

The On-Board Validator utilizes an internal Wi-Fi antenna for remote communication.

RF Output Power Comparison

Per KDB 447498 D01 v06 4.3.1-a "For 100 MHz to 6 GHz and *test separation distances* ≤ 50 mm, the 1-g and 10-g *SAR test exclusion thresholds* are determined by the following:



$[(\text{max. average power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \times [\sqrt{f_{\text{(GHz)}}}] \leq 3.0$ for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR, where $f_{\text{(GHz)}}$ is the RF channel transmit frequency in GHz"

Wi-Fi Antenna

Maximum peak conducted output power = 227.0 mW; antenna gain = 2.5 dBi or 1.8 numerical

EIRP = $227 \times 1.8 = 409$ mW

Duty cycle corrected EIRP = $409 \times 0.022 = 9$ mW

Separation distance = 39 mm

Frequency = 2.462 GHz

SAR test exclusion threshold = $(9 \text{ mW}) / (39 \text{ mm}) \times \sqrt{(2.462 \text{ GHz})} = 0.36 \leq 7.5$,

Device exempt from 10-g extremity SAR.

