



Evaluation of RF Exposure for FXP-853WQ Wireless Communication Module

In this application we seek approval to the FXP-853WQ fixed wireless phone for use in mobile configuration. Based on the FCC OET Bulletin 65 Supplement C and 47CFR 2.1091, we have concluded that the FXP-853WQ will comply with the FCC rules on RF exposure for mobile devices if the antenna gain does not exceed 0.54dBi in GSM and 4.4dBi in PCS band. The following analysis will demonstrate such compliance.

Operation in cellular band (824-849MHz)

The peak conducted output power of FXP-853WQ in cellular band is 32.67dBm. Take the worst case as an example, in which an antenna with 0.54dBi gain is used. The resulted power density at a distance of 20cm can be deducted as follows:

$$\begin{aligned} \text{EIRP} &= 32.67 + 0.54 = 33.21 = 2094.11 \text{ mW} \\ \text{Power Density} &= \text{EIRP} * \text{DutyCycle} / 4 \pi R^2 \\ &= 2094.11 * 0.25 / (4 \pi R^2) \\ &= 0.104 \text{ mW/cm}^2 \end{aligned}$$

where DutyCycle is 0.25 for GPRS class 10 and R is 20cm

The MPE limit for General Population/Uncontrolled Exposure is shown in the FCC OET Bulletin 65 Supplement C and can be calculated as follows:

$$\text{MPE limit} = 824 / 1500 = 0.55 \text{ mW/cm}^2$$

As we can see the resulted power density is below the MPE limit, therefore FXP-853WQ in Cellular band is compliant with the FCC rules on RF exposure.

Operation in cellular band (1850-1910MHz)

The peak conducted output power of FXP-853WQ in cellular band is 34.26dBm. Take the worst case as an example, in which an antenna with 4.4dBi gain is used. The resulted ERP can be expressed as follows:

$$\begin{aligned} \text{EIRP} &= 34.26 + 4.4 = 38.66 = 7345 \text{ mW} \\ \text{Power Density} &= \text{EIRP} * \text{DutyCycle} / 4 \pi R^2 \\ &= 7345 * 0.25 / (4 \pi R^2) \\ &= 0.36 \text{ mW/cm}^2 \end{aligned}$$

where DutyCycle is 0.25 for GPRS class 10 and R is 20cm

$$\text{MPE limit} = 1 \text{ mW/cm}^2$$

The analysis is done in GSM 850/1900 bands. WCDMA850/1900 bands conducted power is less than GSM 850/1900MHz., so these frequency bands power density are also satisfied.