RF exposure limit according to FCC CFR 47part 1, §1.1307, §1.1310

The calculation was done for power density at 20 cm distance for GSM and 315 MHz transmitters operating simultaneously, no limit exists for 131 kHz transmitter.
Simultaneous transmission by GSM module in 824.2 –848.8 MHz and 1850.2 – 1909.8 MHz is not possible. The maximum output power of the control panel containing GSM module, FCC ID:RI7GE864Q2, in 824.2 –848.8 MHz was taken for calculation.

Limit for power density for general population/uncontrolled exposure is f/1500 mW/cm^2 for 300 – 1500 MHz frequency range.

The following must be true:

Power density 1(P_1)/$Limit_1$ + Power density 2(P_2)/$Limit_2$ < 1.

1) Operating frequency range 824.2 –848.8 MHz.

$$Limit_1 = 849/1500 = 0.566\ mW/cm^2$$

The power density $\mathbf{P\ (mW/cm^2) = P_T / 4\pi r^2}$, where
P_T is the maximum equivalent isotropically radiated power which calculation was provided by the applicant (power budget calculation attached):

$$P_T = 33\ dBm - 1.5\ dB - 2\ dB - 3\ dB = 26.5\ dBm = 447\ mW.$$

The power density P at 20 cm (minimum safe distance, required for mobile devices), calculated as follows:

$$P_1 = 447\ mW / 4\pi\ (20\ cm)^2 = 0.09\ mW/cm^2$$

2) Operating frequency range 315 MHz.

$$Limit_2 = 300/1500 = 0.2\ mW/cm^2$$

The 315 MHz transmitter EIRP is 0.015 mW.

$$P_2 = 0.015\ mW / 4\pi\ (20\ cm)^2 = 3 \times 10^{-6}$$

$$P_1/Limit_1 + P_2/Limit_2 = 0.09 / 0.566 + 1.5 \times 10^{-5} = 0.15 < 1.$$

Note: EIRP=25.5 dBm for 1850.2 – 1909.8 MHz range is less than 26.5 dBm.

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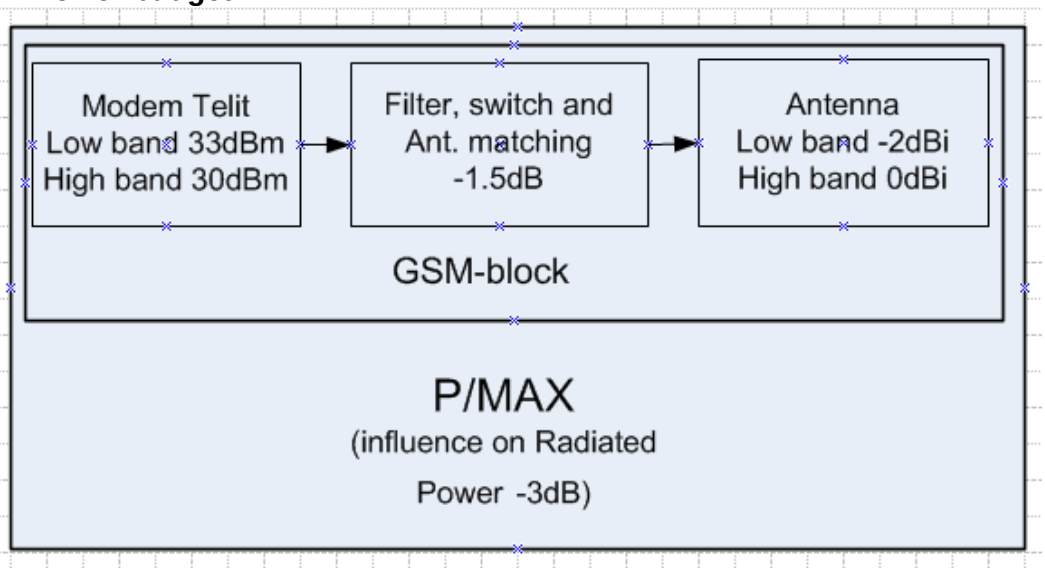
Antenna Gain and Power budget of GSM-USA blocks with Powermax Complete control panel, FCC ID:GSAPWRMCOMPLETE

1. Antenna Gain in the open space:

Low Band 824-849 MHz G=-2 dBi
High Band 1850-1910 MHz G=0 dBi

2. Power budget



Calculation of max Radiated Power for low band (824-849 MHz):

P=33 dBm-1.5 dB-2 dB-3 dB =26.5 dBm

Calculation of max Radiated Power for high band (1850-1910 MHz):

P=30 dBm-1.5 dB-0 dB-3 dB =25.5dBm.

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