Power requirement for the RF quadrupoles

The energy stored in a capacitor is:

$$U = \frac{1}{2}CV^2 \tag{1}$$

where $C = 300$ pF is the big quads, $C = 150$ pF for the small quads, and V is the potential difference:

$$V = V_0 \sin(\omega t) \tag{2}$$

with $\omega = 2\pi \times 6 \times 10^5 = 3.8$ Mcycle/s. On's simulations show that we need 5kV for 1.3m of quadrupole. If we use all the quadrupoles ($\approx$ 20m in total), then the maximum potential V_0 on each quad will be 325V.
The power is the derivative of the energy:

$$P = \frac{dU}{dt} = CV\frac{dV}{dt} = \frac{\omega C V_0^2}{2}\sin(2\omega t) \tag{3}$$

Then, for the big quadrupoles the power consumption becomes

$$P_B = \frac{3.8 \times 10^6 \times 3 \times 10^{-10} \times 325^2}{2} \times \frac{\sqrt{2}}{2} \approx 43 \text{ W} \tag{4}$$

And for the small quadrupoles it becomes ≈ 22 W because the capacitance becomes half.

Actually the amplifiers will not work full-time. For a duty cycle of 10%, the power becomes less than 10W per plate. But the amplifier itself requires some full-time power to run, even when there is no amplification. This should be around 500 W.

In conclusion, the power consumption of each amplifier should be less than 600W.