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We begin with the Ratio Test for Absolute Convergence.

$$\lim_{k\to+\infty}\left|\frac{e^{(k+1)^2}x^{k+1}}{(k+1)!}\cdot\frac{k!}{e^{k^2}x^k}\right|$$

$$=\lim_{k\to+\infty}\left|\frac{e^{2k+1}}{k+1}x\right| = \lim_{k\to+\infty}\frac{e^{2k+1}}{k+1}|x| \qquad \begin{matrix}\longrightarrow+\infty\\ \longrightarrow+\infty\end{matrix}$$

$$=\lim_{k\to+\infty}\frac{2e^{2k+1}}{1}|x| = +\infty$$

So the series diverges for any $x\neq 0$, i.e. it only converges at $x=0$. Thus the domain of the function is only $x=0$.