$$f(t) = E\left(1 - \frac{|t|}{T}\right) = \begin{cases} E\left(1 - \frac{t}{T}\right) & (t \geq 0) \\ E\left(1 + \frac{t}{T}\right) & (t < 0) \end{cases}$$

$$F(\omega) = \int_{-\infty}^{\infty} f(t) e^{-i\omega t}\, dt = \int_{-T}^{0} E\left(1 + \frac{t}{T}\right) e^{i\omega t}\, dt$$

$$+ \int_{0}^{T} E\left(1 - \frac{t}{T}\right) e^{-i\omega t}\, dt$$

$$= \int_{-T}^{T} E\left(1 - \frac{|t|}{T}\right) e^{i\omega t}\, dt$$

$$= 2\int_{0}^{T} E\left(1 - \frac{t}{T}\right) \cos \omega t\, dt$$

$$= 2E\left(\left[E\left(1 - \frac{t}{T}\right) \cdot \frac{\sin \omega t}{\omega}\right]_{0}^{T} - \int_{0}^{T} \left(-\frac{1}{T}\right) \cdot \frac{\sin \omega t}{\omega}\, dt \right)$$

$$= 2E\left(-\frac{1}{\omega T}\left(\frac{\cos(\omega T)}{\omega} - \frac{\cos 0}{\omega} \right) \right)$$

$$= \frac{2E}{\omega^2 T}\left(1 - \cos \omega t\right)$$

$$F(\omega) = \frac{4E}{\omega^2 T} \sin^2\left(\frac{\omega t}{2}\right)$$

$$= ET\, \frac{\sin^2\left(\frac{\omega t}{2}\right)}{\left(\frac{\omega T}{2}\right)^2}$$

$$= ET \left(\frac{\sin \frac{\omega t}{2}}{\frac{\omega t}{2}} \right)^2$$