5.3

$$\tilde{f}(\omega)=\frac{1}{\sqrt{2\pi}}\int_{-\infty}^{\infty}H(x-a)e^{-bx}e^{-i\omega x}dx=\frac{1}{\sqrt{2\pi}}\int_{a}^{\infty}e^{-bx}e^{-i\omega x}dx=$$

$$\frac{1}{\sqrt{2\pi}}\int_{a}^{\infty}e^{-(b+i\omega)x}\,dx=\frac{1}{\sqrt{2\pi}}\frac{e^{-(b+i\omega)x}}{-(b+i\omega)}\Bigg|_{a}^{\infty}=\frac{1}{\sqrt{2\pi}}\frac{1}{-(b+i\omega)}\left[e^{-(b+i\omega)\infty}-e^{-(b+i\omega)a}\right]=$$

$$\frac{1}{\sqrt{2\pi}}\frac{1}{-(b+i\omega)}\left[0-e^{-(b+i\omega)a}\right]=\frac{1}{\sqrt{2\pi}}\frac{e^{-(b+i\omega)a}}{(b+i\omega)}$$