$$\frac{1}{2\pi}\int_{-\infty}^{\infty} dk\ e^{ik(x-x')-\alpha|k|} = \frac{1}{2\pi}\int_{-\infty}^{0} dk\ e^{ik(x-x')+\alpha k} + \frac{1}{2\pi}\int_{0}^{\infty} dk\ e^{ik(x-x')-\alpha k}$$

a)

let $u = ik(x+\alpha-x')$ then $du = i(x+\alpha-x')dk; so\ dk = \frac{1}{i(x+\alpha-x')}du$

$$\frac{1}{2\pi}\int_{-\infty}^{0} dk\ e^{ik(x+\alpha-x')} = \frac{1}{2\pi}\frac{1}{i(x+\alpha-x')}\int_{-\infty}^{0} du\ e^{u} = \frac{1}{2\pi}\frac{e^{ik(x+\alpha-x')}}{i(x+\alpha-x')}\Bigg]_{-\infty}^{0}$$

$$= \frac{1}{2\pi}\frac{e^{0}}{i(x+\alpha-x')} - \frac{1}{2\pi}\frac{e^{-\infty}}{i(x+\alpha-x')} = \frac{1}{2\pi}\frac{1}{i(x+\alpha-x')}$$

b)

let $u = ik(x-\alpha-x')$ then $du = i(x-\alpha-x')dk; so\ dk = \frac{1}{i(x-\alpha-x')}du$

$$\frac{1}{2\pi}\int_{0}^{\infty} dk\ e^{ik(x-\alpha-x')} = \frac{1}{2\pi}\frac{1}{i(x-\alpha-x')}\int_{0}^{\infty} du\ e^{u} = \frac{1}{2\pi}\frac{e^{-ik(-x+\alpha+x')}}{i(x-\alpha-x')}\Bigg]_{0}^{\infty}$$

$$= \frac{1}{2\pi}\frac{e^{-\infty}}{i(x-\alpha-x')} - \frac{1}{2\pi}\frac{e^{0}}{i(x-\alpha-x')} = \frac{1}{2\pi}\frac{-1}{i(x-\alpha-x')}$$

c) adding a) + b) we get

$\frac{x-\alpha-x'-x-\alpha+x'}{2\pi i(x+\alpha-x')(x-\alpha-x')} = \frac{-\alpha}{i\pi(x+\alpha-x')(x-\alpha-x')}$ or $\frac{i\alpha}{\pi(x+\alpha-x')(x-\alpha-x')}$