Table 23.3.1 Basic Properties of the Fourier Transform $\mathrm{F}\{f(t)\} = F(\omega)$

$\mathrm{F}\{Kf(t)\}$	$KF(j\omega)$
$\mathrm{F}\{f_1(t) \pm f_2(t)\}$	$F_1(j\omega) \pm F_2(j\omega)$
$\mathrm{F}\{f(at)\}$	$\frac{1}{\lvert a\rvert} F\left(\frac{j\omega}{a}\right)$
$\mathrm{F}\{f(-t)\}$	$F(-j\omega) = F^*(j\omega)$
$\mathrm{F}\{f(t-a)\}$	$e^{-j\omega a}F(j\omega)$
$\mathrm{F}\left\{\frac{df(t)}{dt}\right\}$	$j\omega F(j\omega)$
$\mathrm{F}\left\{\frac{df^n(t)}{dt}\right\}$	$(j\omega)^n F(j\omega)$
$\mathrm{F}\left\{\int_{-\infty}^{t} f(t)dt\right\}$	$\frac{F(j\omega)}{j\omega} + \pi F(0)\delta(\omega)$
$\mathrm{F}\{tf(t)\}$	$j\frac{d}{d\omega}F(j\omega)$
$\mathrm{F}\{t^n f(t)\}$	$j^n \frac{d^n}{d\omega^n}F(j\omega)$
$\mathrm{F}\{f(t)e^{j\omega_0 t}\}$	$F(j(\omega - \omega_0))$
$\mathrm{F}\{F(t)\}$	$2\pi f(-\omega)$
$\mathrm{F}\{f(t) * g(t)\}$	$F(j\omega)G(j\omega)$
$\mathrm{F}\{f(t)g(t)\}$	$\frac{1}{2\pi}F(j\omega) * G(j\omega)$

Table 23.3.2 Fourier Transform Pairs

$f(t)$	$F(j\omega)$	Reference Equation
$\delta(t)$	1	(23.1.5)
1	$2\pi\delta(\omega)$	(23.1.9)
$u(t)$	$\pi\delta(\omega)+\frac{1}{j\omega}$	(23.2.6)
$u(t+\tau/2)-u(t-\tau/2)$ = rect(t/τ)	$\tau\,\text{sinc}(\omega\tau/2)$	(23.1.2) and (23.2.9)
$\frac{1}{2\pi}\omega_0\,\text{sinc}(\omega_0 t/2)$	$u(\omega+\omega_0/2)-u(\omega+\omega_0/2)$ = rect(ω/ω_0)	(23.1.2) and (23.2.9)
sgn(t)	$=\frac{2}{j\omega}$	(23.2.5)
$e^{-at}u(t)$, $a>0$	$\frac{1}{a+j\omega}$	(23.2.4)
$t^n e^{-at}u(t)$	$\frac{n!}{(a+j\omega)^{n+1}}$	(23.3.15)
$e^{j\omega_0 t}$	$2\pi\delta(\omega-\omega_0)$	(23.1.10)
$\cos\omega_0 t$	$\pi[\delta(\omega+\omega_0)+\delta(\omega-\omega_0)]$	(23.1.11)
$\sin\omega_0 t$	$j\pi[\delta(\omega+\omega_0)-\delta(\omega-\omega_0)]$	(23.1.12)
$(\cos\omega_0 t)u(t)$	$\frac{\pi}{2}[\delta(\omega+\omega_0)+\delta(\omega-\omega_0)]+\frac{j\omega}{\omega_0^2-\omega^2}$	(23.3.19)
$(\sin\omega_0 t)u(t)$	$\frac{\pi}{2j}[\delta(\omega+\omega_0)+\delta(\omega-\omega_0)]+\frac{\omega_0}{\omega_0^2-\omega^2}$	(23.3.20)
$e^{-at}(\cos\omega_0 t)u(t)$, $a>0$	$\frac{a+j\omega}{\omega_0^2+(a+j\omega)^2}$	(23.2.7)
$e^{-at}\sin\omega_0 t u(t)$, $a>0$	$\frac{\omega_0}{\omega_0^2+(a+j\omega)^2}$	(23.2.8)