$$FT\{a(t) \times c(t)\} = A(f) * C(f)$$

$*$ CONVOLUTION

a(t) = modulating signal = square wave of various amplitudes.

$$C(f) = \frac{e^{jf\phi/Fc} \times \{\delta(f - F_c) + \delta(f + F_c)\}}{2}$$

c(t) = phase shifted carrier signal = $\cos(2\pi F_c t + \phi)$

F_c = carrier frequency

when $f = F_c$

QAM signal = a(t) x c(t)

$$C(f) = e^{j\phi}/2$$

when $f = -F_c$

$$C(f) = e^{-j\phi}/2$$

for all other values for f ;

$$C(f) = 0$$

Therefore the frequency spectrum of the phase shifted carrier is just 2 phasors at +/- Fc with magnitude 1/2 and phase of phi.