$$p(\theta, w \mid \mathbf{y}) \propto w^{(n+d+1)/2-1} \exp\left(-w(n+\kappa) \frac{\left(\theta - \frac{n\bar{y} + \mu\kappa}{n+\kappa}\right)^2}{2} \right) \exp\left(-\frac{w}{2}\left(\mathbf{y}^\top \mathbf{y} + \kappa\mu^2 + \eta + \frac{(n\bar{y} + \mu\kappa)^2}{n+\kappa} \right) \right)$$

$$d^* = n + d, \ \eta^* = \mathbf{y}^\top \mathbf{y} + \kappa\mu^2 + \eta + \frac{(n\bar{y} + \mu\kappa)^2}{n+\kappa}, \ \kappa^* = (n+\kappa), \ \mu^* = \bar{y}\frac{n}{n+\kappa} + \frac{\kappa}{n+\kappa}\mu$$

$$p(\theta, w \mid \mathbf{y}) \propto w^{(d^*+1)/2-1} \exp\left(-w\frac{\kappa^*\left(\theta - \mu^*\right)^2}{2} \right) \exp\left(-w\frac{\eta^*}{2} \right)$$

$$p(\theta \mid \mathbf{y}) \propto \int_0^\infty w^{(d^*+1)/2-1} \exp\left(-w\frac{\kappa^*\left(\theta - \mu^*\right)^2}{2} \right) \exp\left(-w\frac{\eta^*}{2} \right) dw$$

$$\propto \int_0^\infty w^{(d^*+1)/2-1} \exp\left(-\left(\frac{\kappa^*\left(\theta - \mu^*\right)^2}{2} + \frac{\eta^*}{2} \right) w \right) dw$$

$$\propto \Gamma\left(\frac{d^*+1}{2} \right) \left(\frac{\kappa^*\left(\theta - \mu^*\right)^2}{2} + \frac{\eta^*}{2} \right)^{-\frac{d^*+1}{2}}$$

$$\propto \left(\frac{\eta^*}{2} \right)^{-\left(\frac{d^*+1}{2} \right)} \Gamma\left(\frac{d^*+1}{2} \right) \left(\frac{1}{d^*}\left(\frac{\theta - \mu^*}{\sqrt{\eta^* / \kappa^* d^*}} \right)^2 + 1 \right)^{-\frac{d^*+1}{2}}$$

$$m = \mu^* = \frac{n\bar{y} + \mu\kappa}{n+\kappa}, \ s = \sqrt{\eta^* / \kappa^* d^*} = \sqrt{\frac{\mathbf{y}^\top \mathbf{y} + \kappa\mu^2 + \eta + \frac{(n\bar{y} + \mu\kappa)^2}{n+\kappa}}{(n+\kappa)(n+d)}}$$