PROOF OF FORMULA 3.524.4

$$\int_0^\infty x^{2m+1} \frac{\sinh ax}{\cosh bx}\, dx = \frac{\pi}{2b} \left(\frac{d}{da}\right)^{2m+1} \left(\sec \frac{\pi a}{2b}\right)$$

Entry 3.511.4 states that

$$\int_0^\infty \frac{\cosh ax}{\cosh bx}\, dx = \frac{\pi}{2b} \sec\left(\frac{\pi a}{2b}\right).$$

The result follows by differentiating $2m+1$ times with respect to the parameter a.