TOOL: Once a parallel impedance is simplified to a single (real) resistance in parallel with a single imaginary impedance, (1) and (2) give the value of the equivalent impedance.

$$R||jX = \frac{RX}{R^2+X^2}(X+jR) \qquad \text{Rectangular form} \qquad (1)$$

$$R||jX = \frac{RX}{\sqrt{R^2+X^2}}e^{j\tan^{-1}(R/X)} \qquad \text{Polar form} \qquad (2)$$

DERIV: Derivation of formulas (1) and (2).

$$R||jX = \frac{jRX}{R+jX}\cdot\frac{R-jX}{R-jX}$$

$$R||jX = \frac{RX^2}{R^2+X^2}+j\frac{R^2X}{R^2+X^2}$$

$$R||jX = \frac{RX}{R^2+X^2}\cdot(X+jR) \qquad \text{Rect} \qquad (1)$$

$$R||jX = \frac{RX}{R^2+X^2}\cdot\sqrt{R^2+X^2}\,e^{j\tan^{-1}(R/X)}$$

$$R||jX = \frac{RX}{\sqrt{R^2+X^2}}e^{j\tan^{-1}(R/X)} \qquad \text{Polar} \qquad (2)$$