Complex Power Formulas

Preface: Complex Power Problems will either be presented with RMS (Root Mean Square) values or Maximum values. You can convert between the two, but you have to stick with one.

Conjugate	$(a + bi)^* = a - bi$
RMS-Maximum Conversion	$X_{RMS} = \dfrac{1}{\sqrt{2}} X_m$ and $X_M = \sqrt{2} X_{RMS}$
Complex Power (VA)	$S = P + Qj$
Complex Power for a Source (VA)	$S = \dfrac{1}{2} V_m I_m^* = V_{RMS} I_{RMS}^*$
Complex Power for an Element (VA)	$S = \dfrac{1}{2} I_m I_m^* Z = I_{RMS} I_{RMS}^* Z$
Real/Average Power (W)	$P = \dfrac{V_m I_m}{2} cos(\theta_v - \theta_i)$
Imaginary/Reactive Power (VAR)	$Q = \dfrac{V_m I_m}{2} sin(\theta_v - \theta_i)$
Power Factor (Degrees)	$pf = cos(\theta_v - \theta_i)$
Reactive Factor (Degrees)	$rf = sin(\theta_v - \theta_i)$
Average Power (W)	$P_{avg} = |I_{RMS}^2| \bullet R$
Apparent Power (Magnitude of Complex Power)	$|S| = \sqrt{P^2 + Q^2}$