Properties of chiral superfields:

① Product of left-chiral superfields is also left-chiral superfield.
" " right-chiral " " " right-chiral " .

Thanks to Leibniz rule:

Proof: Let Φ_1 and Φ_2 be two left chiral superfields,
that is $D^\dagger_{\dot\alpha}\Phi_1 = 0$ and $D^\dagger_{\dot\alpha}\Phi_2 = 0$

check: $D^\dagger_{\dot\alpha}(\Phi_1\Phi_2) = (D^\dagger_{\dot\alpha}\Phi_1)\Phi_2 + \Phi_1(D^\dagger_{\dot\alpha}\Phi_2)$
$= 0 + 0$ ✓

Therefore, the superfunction $W(\Phi)$, if complex analytic (holomorphic), will also be a chiral superfield.

written as a polynomial in Φ and not Φ^*.

② If Φ_{gen} is a general superfield,
then $(D^\dagger_{\dot\alpha}D^{\dagger\dot\alpha})\Phi_{gen}$ is a left-chiral superfield.
and $(D^\alpha D_\alpha)\Phi_{gen}$ is a right-chiral superfield.

Reason: $D^{\dagger\dot\alpha}(D^\dagger D^\dagger)\Phi = 0$ and $D_\alpha(DD)\Phi = 0$.