Involution inverting gradings on matrix algebras

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Let F be an algebraically closed field of characteristic zero, and G be a finite abelian group. If $M_n(F)$ is an algebra with involution $*$, we describe G-gradings $M_n(F) = A = \oplus_{g\in G} A_g$ on A, satisfying $(A_g)^* \subseteq A_{g^{-1}}$, for all $g \in G$.

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