For a hypergraph $H = (V, E)$ and a field $\mathbb{F}$, a weighting of $H$ is a map $f : V \to \mathbb{F}$. A weighting is called stable if the sum of the weights on each edge of $H$ is constant. The set of all stable weightings of $H$ forms a vector space over $\mathbb{F}$ called the uniformity space of $H$ over $\mathbb{F}$, and its dimension is called the uniformity dimension of $H$ over $\mathbb{F}$. For $l \geq 2$ the uniformity dimension of random $l$-uniform hypergraphs is shown to be almost surely 1. The uniformity dimensions of some highly structured hypergraphs are determined.