## Supporting Information

## Quasi-2D lead-free halide perovskite using superalkali cations for red-light-emitting diodes

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**Figure S1.** The calculated total and partial density of states for the quasi-2D  $PEA_2H_5O_2Sn_2Br_7$  perovskite with a vacuum thickness of 15 Å obtained by HSE potential including SOC effect and vdW correction.



**Figure S2.** After AIMD simulation, the calculated total and partial density of states for the quasi-2D  $PEA_2H_5O_2Sn_2Br_7$  perovskite with a  $3\times3\times1$  supercell and a vacuum thickness of 15 Å, respectively. The dash line represents Fermi level set to zero.



Figure S3. The emission region of the quasi-2D PEA<sub>2</sub>H<sub>5</sub>O<sub>2</sub>Sn<sub>2</sub>Br<sub>7</sub> perovskite is marked in yellow.