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Temperature and Current Bias Dependence of All-MgB_2 RSFQ Toggle Flip Flop Circuits ELIAS GALAN, DANIEL CUNNANE, KE CHEN, XIAOXING XI, Temple University — We have fabricated and tested Rapid Single Flux Quantum Toggle Flip Flop (TFF) Circuits using self-shunted MgB_2/MgO/MgB_2 Josephson Junctions with a single ground layer to reduce parasitic inductance. The MgB_2 film and electrodes were deposited using HPCVD, and the MgO barrier was deposited using DC reactive sputtering. We highlight the circuits' operation dependence on current bias and temperature which show operation from 8 K to 33 K. The highest attained operating speed is 240 GHz at 10 K. These results demonstrate the versatile temperature range and speed of MgB_2 based circuits and devices.

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