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Thermally reliable clocked non-volatile spin wave logic device SOURAV DUTTA, Georgia Inst of Tech, DMITRI NIKONOV, SASIKANTH MANIPATRUNI, IAN YOUNG, Components Research, Intel Corporation, Hillsboro, AZAD NAEEMI, Georgia Inst of Tech — The possibility of utilizing spin waves for information transmission and computation has been an area of active research due to the unique ability to manipulate the amplitude and phase of the spin waves for building complex logic circuits. Here, we present a comprehensive scheme for building a thermally reliable clocked non-volatile spin wave logic device [1,2] (SWLD) by introducing a charge-to-spin converter that translates information from electrical domain to spin domain, exploiting the magneto-electric effect for spin wave transmission, detection and non-volatile memory, utilizing the phase of the spin wave as information token, ensuring phase-dependent deterministic switching of the magnetoelectric spin wave detector in the presence of thermal noise via compensation of demagnetization and a novel clocking scheme that ensures sequential transmission of information in a cascaded SWLD and non- reciprocity. [1] S. Dutta et. al., Non-volatile clocked spin wave interconnect for beyond-cmos nanomagnet pipelines, Scientific Reports 5 (2015). [2] S. Dutta et. al., Phase-dependent deterministic switching of magnetoelectric spin wave detector in the presence of thermal noise via compensation of demagnetization , Applied Physics Letters (accepted 2015).

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