Temporal and spatial variations of high and low contents of Ti basalts in the Permian Emeishan large igneous province (ELIP) of southwest China and Vietnam are crucial for modeling of continental basalt formation and the nature of mantle–lithosphere interaction. A combined geochemical and magnetostratigraphic study was carried out at Yanyuan (Sichuan province) and Binchuan (Yunnan province) areas in the inner zone of the ELIP. Geochemical results indicate that the basalts are low-Ti (LT) basalts (Ti/Y ≈ 484.2–511.4) in the Luomapu section and high-Ti (HT) basalts (Ti/Y ≈ 558.2–658.9) in the Gongmushan section at Yanyuan. Systematic paleomagnetic sampling and stepwise thermal demagnetization demonstrate that the higher temperature component shows two distinct characteristic remanent magnetizations with northeasterly upward and SWW downward directions from both sections. These results indicate a simple magnetostratigraphic normal and reversed polarity pattern from the lower and upper parts of the section, respectively. By comparing with available magnetostratigraphic and paleomagnetic data carried out in the ELIP, these results imply that the eruption of the Emeishan basalts can be divided into early (normal polarity subchron) and late (reversal subchron) stages. The early stage included LT basalts in the inner zone and most of the HT basalts in the intermediate and outer zones, and the late stage contained a part of LT and HT basalts in the upper parts of the sections in the inner zone and a few in the intermediate zone of the ELIP. Correlating with available Middle–Late Permian magnetostratigraphy and the Permian magnetic time scale, the new magnetic polarity sequence result suggests that the ELIP formed over a very short time interval (<1 Myr).