The concept of a single frequency band, single high-refractive-index metamaterial has been extended and applied in the design of dual frequency band, dual high-refractive-index metamaterials in the THz regime. The structure design consists of twenty five unit-cells with a surface area of 250 um by 250 um and a thickness of 5 um. Each cell has metallic structures embedded in a polyimide substrate. The return loss (S-parameter) analysis show two strong electric responses at two frequency ranges and the extracted constitutive parameters suggested high values of simultaneous dielectric constant and permeability at these frequencies. Results retrieved from the S parameters also show high refractive index values. Two peaks of high refractive index values are shown in the final result of our design. Analysis show that higher refractive index at the second resonance frequency band is achievable through redesign of the structures, and modifications could lead to a single structure with multiple frequency, multiple high-refractive-index metamaterials that can be put to practical use.