In this study, an ultra-wide band (UWB) energy harvesting circuit was proposed using the Greinacher rectifier circuit. The circuit was designed with Wilkinson power combiner (WPC) for use at two different radio frequency signal inputs. To enable broadband operation, the multisection Chebyshev impedance matching technique was applied in the branches of the WPC circuit. The center frequency was selected 2.2 GHz in the design. In terms of the parameters of reflection, transmission and isolation, the WPC circuit operates in the 0.4 GHz-3.4 GHz range and the percentage bandwidth has been calculated as 136%. In the designed Greinacher rectifier circuit, power conversion efficiency (PCE) was analyzed for different input powers. When load resistor selected as $R = 1500 \, \Omega$, the PCE for the input power of 9 dBm was about 70%. The proposed circuit, where WPC and Greinacher rectifier circuits was used together for energy harvesting; was operated in the frequency ranges $BW_1 = 0.4$-0.81 GHz, $BW_2 = 1.54$-1.84 GHz, and $BW_3 = 2.2$ GHz-2.89 GHz. As a power combining application, dual power inputs were applied to the WPC circuit with frequencies of 540 MHz-1800 MHz, 540 MHz-2450 MHz, 540 MHz-2700 MHz, 800 MHz-1800 MHz, 800 MHz-2450 MHz and 800 MHz-2700 MHz. Eventually, approximately 70.5% PCE and 1.65 V output voltage were obtained.