Evidence for local moment magnetism in superconducting FeTe$_{0.35}$Se$_{0.65}$ GUANGYONG XU, ZHIJUN XU, JINSHENG WEN, Brookhaven National Laboratory, SONGXUE CHI, NIST Center for Neutron Research, WEI KU, GENDA GU, JOHN TRANQUADA, Brookhaven National Laboratory — We investigate the temperature evolution (from 5 K to 300 K) of low energy spin fluctuations in Fe-based superconductor FeTe$_{0.35}$Se$_{0.65}$ ($T_c \sim 14$ K) via inelastic neutron scattering. The magnetic excitation spectrum in the superconducting phase appears qualitatively similar to those observed in other Fe-based superconductors, with a spin gap (at about 5 meV) and a resonance peak at $\hbar \omega \sim 6.5$ meV. At higher temperatures, the spectral weight of the low-temperature resonance is found to redistribute to lower energies below the spin gap. A significant moment ($\gtrsim 0.26 \mu_B$/Fe) is found for the integrated spectral weight below merely $\hbar \omega \sim 12$ meV, with nearly no temperature dependence up to 300K, indicating existence of strong local moments.