An $E \times B$ drift poloidal rotation is now considered as an effective mechanism to suppress the plasma instabilities [1]. So, the direct radial electric field $E_r$ studies are important ingredient for understanding the role of $E_r \times B_t$ shear poloidal rotation in the turbulence suppression. In the T-10 tokamak, the mean values of $E_r$ were retrieved via plasma electric potential measured by heavy ion beam probe (HIBP) [2]. On top of that, recent advances in the T-10 HIBP allows us to measure simultaneously the plasma potential and density fluctuations within the frequency domain up to 250 kHz in 5 poloidally shifted sample volumes with the 5-slits energy analyser [3] in the plasma core ($0.07 \text{ m} < r < 0.2 \text{ m}$). Cross-phase $\theta_{ij}$ between density fluctuations in two sample volumes poloidally shifted at $\Delta x_{ij}$, each observed by corresponding analyzer entrance slits with numbers $i$ and $j$, gives the information on the poloidal turbulence rotation velocity: $V_{\text{turb}} = \Delta x_{ij} \cdot 2\pi f/\theta_{ij}$, $i, j = 1-5, i \neq j$ [4]. The ohmic plasmas with $R/a = 1.5 \text{ m}/0.3 \text{ m}$, $B_t = 2.2 \text{ T}$, $I_{pl} = 230 \text{ kA}$, $n_e = 1 \times 10^{19} \text{ m}^{-3}$ were studied. For the stochastic low-frequency fluctuations (SLF) [5] with $f_{\text{SLF}} = 0-30 \text{ kHz}$, $V_{\text{SLF}} \sim 2.5-3 \text{ km/s}$ is directed towards the ion diamagnetic drift. For the low-frequency quasi-coherent fluctuations (LFQC) [6], $f_{\text{LFQC}} = 50-200 \text{ kHz}$, $V_{\text{LFQC}} \sim -10-15 \text{ km/s}$ is directed towards the electron diamagnetic drift. It has been shown that $E_r = -60 \text{ V/cm}$, so $E_r \times B_t$ rotation velocity $V_{E \times B}$ equals to $-3 \text{ km/s}$ and directed to the electron diamagnetic drift. The effect of EC heating on the $E \times B$ and turbulence rotation will be also presented.

References