The East Kunlun Active Fault Belt (EKAFB) with about 1600 km long, which lies in east of Altyn Tagh fault and trends in NWW, is a tremendous lateral sinistral strike-slip fault belt in northern Tibet Plateau. Its tremendous length and larger lateral left strike-slip rate as well as strong laterally shortening played a very important role in adjusting the convergence of India’s collision with Eurasia plate and the rise of Tibet Plateau, and the fast lateral left strike-slip resulted in 4 strong earthquakes with magnitude Ms 7.0-8.1 occurred since 1937. At the northeast edge of Tibet Plateau where EKAFB, West Qinling orogenic belt and Zoigê block of Songpan-Garze fold zone meet there, the crust suffered very strong deformation along with its movement directions changed from near south-north to east-northeast and the geological structures are very complicated. In the west of Maqu, the EKAFB has widespread outcrops and clear free surface trend, whereas it presents complicated distributions near Maqu at northeast Tibet Plateau. In order to determine the fine crustal structure characteristics beneath the EKAFB and its adjacent area at the northeast Tibet Plateau, based on the portable digital seismic data record system with ultra-low power consumption, a first high resolution seismic refraction profile with 200km long which is nearly perpendicular to the central Zoigê block along with West Qinling orogenic belt and overlapped with a 670 km long wide angle reflection/refraction profile, were carried out by Geophysical Exploration Center, China Earthquake Administration in 2004, and high quality seismic data were collected. The Pg data obtained from the high resolution seismic refraction profile were processed by seismic wavefront tomography method. The fine P wave velocity structures of upper crust beneath Zoigê block and West Qinling orogenic belt were determined. The results reveal that the crust above 3 km in depth presents a strong vertical gradient layer and its P wave velocity is 3.8-5.3 km/s, which reflects the structural characteristics of shallow covers with little deformation. Beneath the shallow covers, the upper crustal structures are very complicated and suffered from strong deformations. The main Kusaihu-Maqin fault in EKAFB shows a large low velocity zone with about 30 km wide below the depth of about 3 km, and at two sides of the low velocity zone, there are very similar velocity structure features, which suggests that EKAFB extends eastward and sliced the crystalline basement of Zoigê block of Songpan-Garze fold zone. Zhouqu-Liangdan Fault is likely to be the boundary fault between Songpan-Garze fold zone and Western Qinling orogenic belt due to the great differences of upper crustal structures at its two sides.