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*Abstract*—An integrated dual polarization (IDP) mixer at 350 GHz, which integrates a superconductor-insulator-superconductor (SIS) junction mixers with a planar orthomode transducer (OMT), has been designed and fabricated. The IDP mixer makes a receiver system with dual polarization observation capability more compact, which is significant factor for multi-pixel receiver. The orthogonal waveguide probes separate the incoming signals from a circular waveguide into two polarizations, and then the signals propagate to individual SIS mixer through the integrated transmission line which also behaves as an impedance match circuit. All circuits are implemented on a  $2\mu$ m thick silicon nitride membrane which is suspended in a gap of 20 um across the circular waveguide. The devices were fabricated by a standard Nb-based SIS junction technology and SiN/Si membrane process. We have measured the performance of fabricated IDP mixers. The double-side-band (DSB) receiver noise temperature ( $T_{rx}$ ) of both polarizations, measured simultaneously in a 4K cryostat, is approximately 100K at between 332GHz and 372GHz. The isolation of cross polarization is approximately 20dB. The detail of fabrication and performance of IDP mixers will be presented.