Development of Wideband 100-GHz SIS Mixers foraNew Multi-beam Receiver

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We are developing wideband SIS mixers at 100-GHz band. As the first step of this development, we are developing SIS mixers for the*"FOREST"*(FOur beamREceiver System on 45m-Telescope*)* installed on the45-m millimeter-wave telescope located at Nobeyama Radio Observatory (NRO), Japan. Each beam of *FOREST*consists ofone ortho-mode transducer and two sideband-separating (2SB) mixers, and then, the *FOREST*needs eight 2SB mixers in total.The target receiver noise temperature is 40 K or lower over the IF range of 4-12 GHz and the RF range of 80-116GHz. We newly designed SIS mixersthat have a series-array junction in order to avoid saturation, acoplanar inductor loaded microstrip impedance transformer for wideband operation, and hammer filter as RF choke. In this design, we quantify and correct the differences between the model and actual transmission-lines, which occur from structural discontinuity in the circuit. These mixers were evaluated in our laboratory and showed good performances that met the present specifications of *FOREST*. These mixers will be installed into the *FOREST* from the next observation season. Based on these experiences, the next step of this development is to achieve a wider IF bandwidth of ~20GHz with covering the RF frequency range of 67-116GHz. We will also describethis future plan.