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This paper reports UHF-L band low-noise dual-gate GaAs MESFET devices developed in NSR. The devices are applied to UHF electric tuner of TV, with a remarkable improvement in noise figure ( $\sim 3\text{dB}$ ) — as low as that of VHF tuner; and they also can be used in wide-band low-noise UHF amplifiers and low-noise L-band amplifiers, with the highest operating frequency of over 3GHz and noise figure of less than 1dB at 1-1.5GHz band.

The dual-gate GaAs MESFET was designed to be recess-gate structure with two dual-interdigital Al-gate electrodes positioning in cylindric recesses. The thickness of the active layer is thinned with an etching method so as to meet design requirements and control parameter uniformity. Devices have been produced using an  $n^- - n^+$  multiple-layer wafers grown continually on semi-insulation GaAs substrates in a Ga-AsCl<sub>3</sub>(S<sub>n</sub>Cl<sub>4</sub>)-H<sub>2</sub> system.

These devices are manufactured with a conventional photoetching process and a metal lift-off technique, thus providing the gate-electrode with gate-length of  $\leq 1\mu\text{m}$  and gate-width of 400 $\mu\text{m}$ , good stability and high reproducibility; the source-drain electrode are formed also with the lift-off method; and finally an insulation protective film is made on the chip shown in photo 1.

For dual-gate MESFETs both plastic and metal-ceramic packages are adopted, as presented in photo 2 and 3. The packaged devices yields an optimum noise figure of 0.7dB and 0.9dB with an associated gain of 20dB and 15dB at 1GHz and 1.9GHz, respectively. It is envisaged that these devices will have been widely utilized in future.

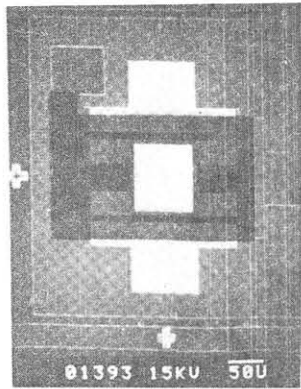


Photo: 1

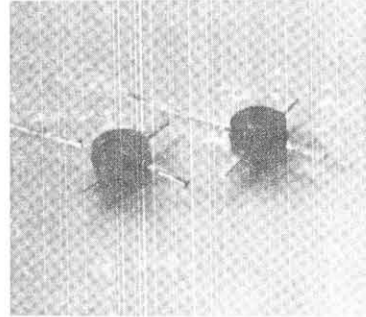


Photo: 2

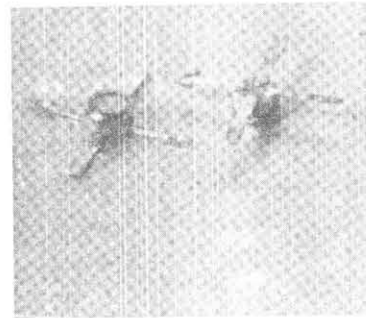


Photo: 3