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THE DESIGN OF A TWO-STAGE WIDE DYNAMIC RANGE ANALOGY AGC TECHNOLOGY

Abstract

Abstract: With the rapid growth of wireless communication, the problems of electromagnetic interference are now getting worse. The RF receivers which usually used in front-end of the satellite repeater are easily influenced by the jammed signals. In order to adjusting the RF-power transferred to the input of the analog-to-digital converter under the complex environment, automatic gain control (AGC) is becoming an essential function in receivers. As known, the dynamic range of AGC is expanding widely, even reach to 100dB. Based on the multi-stage AGC's extreme range and impact factors, we proposed a wide dynamic range analogy AGC receiver which is two-stage cascade. Experiments shows that the receiver's input dynamic range reaches to 100dB, and each stage AGC module can reach to 50dB. To satisfy the requirements of the receivers' good linearity and low noise figure, the first-stage AGC module which is the regulable attenuator placed in RF channel's front-end, and the second-stage AGC module which is the regulable gain amplifier placed in IF channel. With delicate arrangements, the two-stage AGC modules are changed with the controlled-voltage to adapt to the wide-range RF power. The two-stage AGC modules are operated separately during different power statements When the RF signals is the smallest, the regulable attenuator is in minimum attenuation, the regulable gain amplifier provided the maximum gain. Along with the increasing RF signals, the regulable attenuator is kept in constant, and the gains of the second-stage AGC module are decreased. When the RF power reached to some point, the second-stage AGC module is in minimum gain statement and not in change, the regulable attenuator is implemented to increase the attenuation according to the adding signals. Compared with the existing receivers, our design system has nearly 30dB expansion in the dynamic range. Not just expanded the wide dynamic range, but also avoided the saturation of the receiver, and influenced least on noisy figure as far as possible.