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## Noise Reduction In High Frequency Amplifiers Using Transmission Lines To Provide Feedback

Tech ID: 32792 / UC Case 2019-970-0

### BACKGROUND

Low noise amplifiers are ubiquitous in wireless data network receivers and radios. The

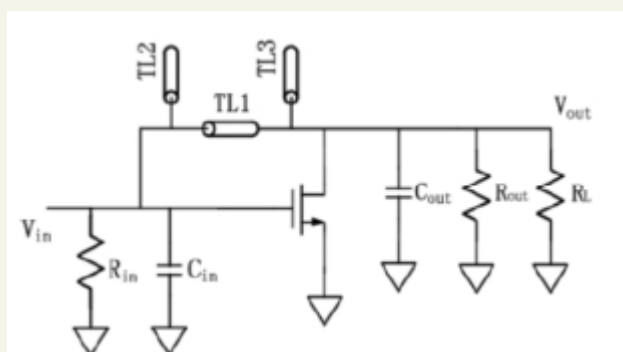
maximum transmission distance is limited by the receiver noise which is mostly determined by the noise figure of the first amplifier stage, the LNA. Reduction of LNA noise is thus always desirable in that it can increase transmission range or reduce power consumption resulting in higher performance or reduced system cost. This approach lowers the noise of the LNA relative to the other available methods.

### TECHNOLOGY DESCRIPTION

Noise canceling Low noise amplifiers typically use local resistive feedback to provide scaled sampling of the main amplifier noise.

Providing this feedback using a lossless transmission line structure eliminates the resistor noise even further reducing the overall LNA noise figure. Additionally proper transistor sizing can be added to naturally provide improved linearity.

Feedback amplifier designs are widely used in low-noise amplifier (LNA) designs. In general, the adoption of feedback architectures in LNA designs are useful for gain desensitization, bandwidth broadening and increased linearity. In the mmWave frequency range, small wavelengths make transmission lines practical for use in IC designs. The invention uses a transmission line feedback path to realize the benefits of a feedback amplifier without introducing additional noise via the feedback network.



### APPLICATIONS

Wireless data network receivers and radios

### ADVANTAGES

- ▶ Lower noise than alternative approaches
- ▶ Improved linearity in noise canceling LNAs.
- ▶ Use of a noiseless transmission line network as a substitute for a resistor in feedback amplifier designs

### INTELLECTUAL PROPERTY INFORMATION

Country	Type	Number	Dated	Case
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### OTHER INFORMATION

#### KEYWORDS

Noise cancelling low noise amplifier,  
 Feedback reduction, 60 GHz  
 amplifiers, Transmission line  
 feedback

#### CATEGORIZED AS

- ▶ **Communications**
  - ▶ Internet
  - ▶ Networking
  - ▶ Wireless

#### RELATED CASES

2019-970-0

## RELATED MATERIALS

▶ [Transmission Line Based Noise-Canceling LNA Design in 60GHz Communication - 12/01/2019](#)

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