

Description

The Gaussian Noise Generator (GNG) has applications in electronic countermeasures and wireless communication systems. In the case of electronic countermeasures, RADAR deception can be accomplished by saturating the radar receiver or providing false information. The GNG can prevent or disrupt the detection scheme of the radar or prevent it from target Doppler shift estimation.

Modern RADARs use a variety of techniques to evade countermeasures, improve detection resolution and adapt to an ever changing electromagnetic environment. It's achieved by ultra-wide band operation, agile Frequency or pulse repetition interval (PRI) hopping and other techniques. Similar considerations can be applied to communication systems.

For countermeasures to be effective, the GNG has to support ultra-wideband operation and adaptation agility. At the same time, these systems have very tight system constraints on size-weight-and-power (SWaP), especially on transmitter power. Furthermore, noise generation should be generated so that it does not disrupt specific frequency band(s) and allow continuous operation in these bands.

This reference design includes the generation of a Wideband Gaussian Noise signal using a poly-phase approach. The subsequent signal processing enables users to populate only desired spectral bands with custom-defined magnitude for each band.

A run-time user interface is provided to change bandwidth and amplitude parameters in real-time. Such reconfiguration can be completed very fast by the host system. With the availability of hardened Floating-Point operators in Arria 10's DSP block, this design achieves wide dynamic ranges with an improved signal to noise ratio.

Since the DAC used in this design has maximum sampling rate of 5GSPS, the instantaneous processing bandwidth supported by the design is 2.5GHz.

Features

- Wideband Gaussian Noise source – 2.5GHz
- Digital Filter Banks
- Fine Spectral Resolution < 2.5MHz
- Dynamic Band and Magnitude control
- Floating-Point Processing in FPGA
- Arria-10 Development Kit
- AD9162 – 5GSPS DAC with JESD204B Interface

Applications

- Military Radar and Electronic Warfare systems
- Wide-Band Communication Systems
- Hardware Accelerated Simulations

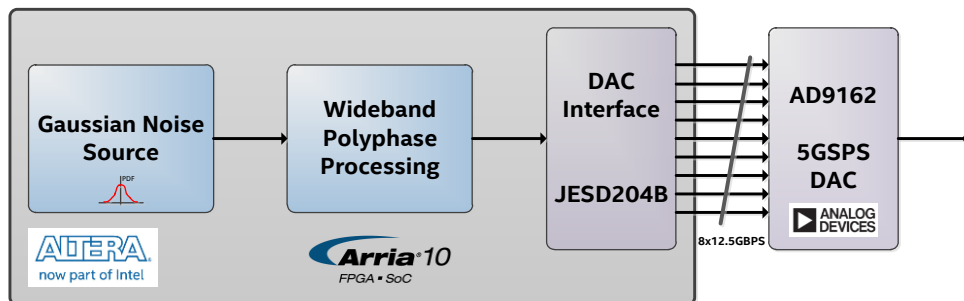


Figure 1: Gaussian Noise Generator System