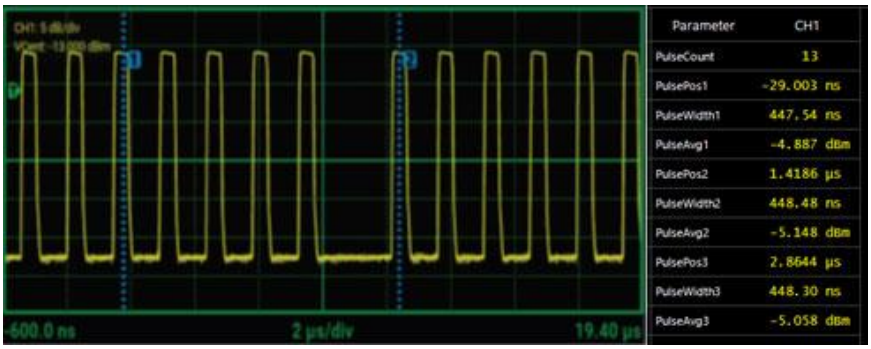
Amplifier Linearity Testing for Radar Systems

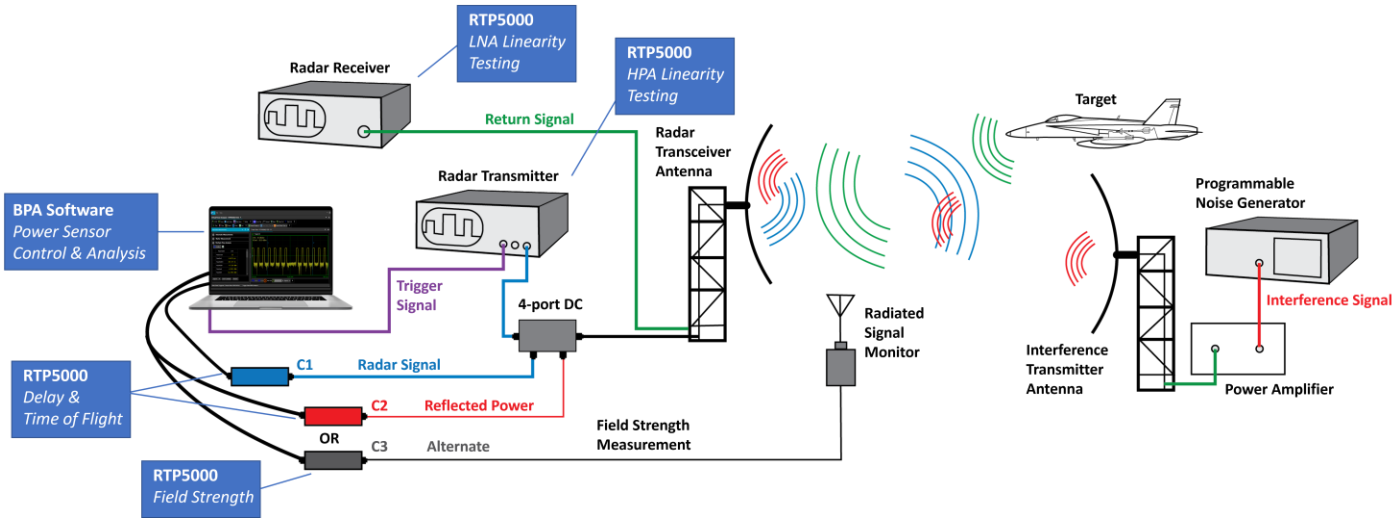
Linearity is a characteristic used to determine the behavior and performance of amplifiers, which are critical components for high-fidelity radar signals. Linear amplifiers reproduce signal transmissions faithfully, while nonlinear amplifiers can introduce waveform distortions and impede target detection, identification, and tracking.



IFF Interrogation Response (left) with Important Pulse Parameters (right)

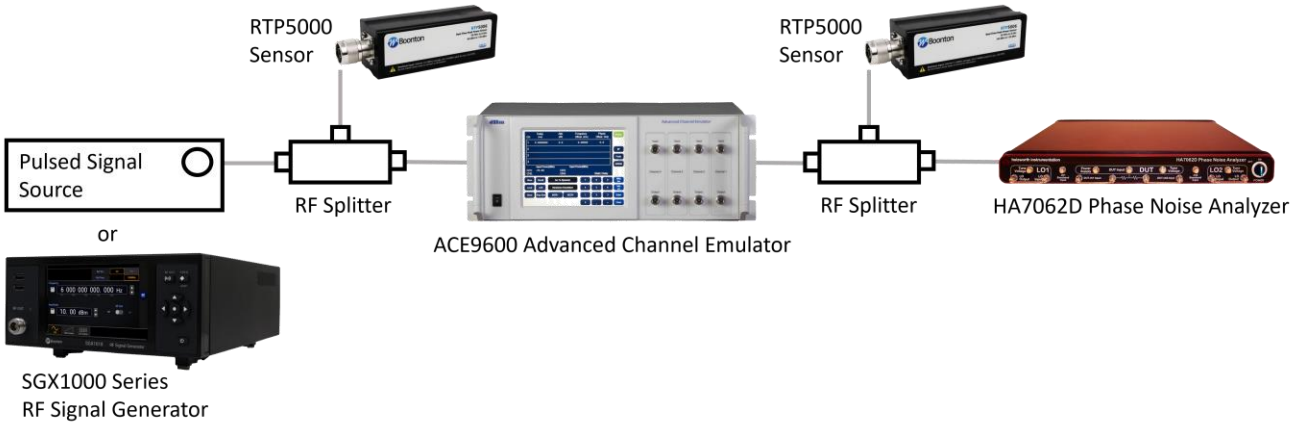
The RTP5000 Series can provide the most accurate results for today's advanced radar, such as identification friend or foe (IFF) systems. Fast rise times (< 3 nanoseconds) track pulse edges cleanly and accurately, while wide video bandwidth (195 MHz) can capture a pulsed signal's envelope power. Fine time resolution (100 picoseconds) enables precise information on timing, pulses with narrow spacing, and characteristics of the pulse shape. Essential for IFF interrogation response signals, multi-pulse analysis verifies proper pulse spacing and amplitude levels. With parallel measurement processing that produces 100,000 measurements per second, the RTP5000 Series ensures the fidelity of radar signals with real-time, gap-free analysis.

Peak power sensors can also characterize amplifier nonlinearity and compression with crest factor (CF) measurements and by plotting complementary cumulative distribution function (CCDF) curves, which provides a statistical view of CF occurrence.



AOC 2023 Test Setup:

An RTP5000 Series sensor monitors the CF from the output of the signal source. The ACE9600 contains the amplifier under test for this measurement setup, which can be distorted to show examples of nonlinear performance. Another RTP5000 Series sensor measures the CF of the signal that has passed through the amplifer for linearity analysis. Using the pulsed signal source, the RTP5000 Series caputres and analyzes power measurements essential for pulsed RF signals.



Product Overview:

Boonton RTP5000 Series Real-Time USB Peak Power Sensors:
Boonton RTP5000 Series sensors utilize Real-time Power Processing™ technology to deliver the fastest measurement rate of 100,000 measurements per second with zero latency or gaps in acquisition. This performance enables accurate characterization of pulsed RF signals. CF measurement capability can quickly establish if amplifiers are being driven into compression.

- Accurate pulse measurements
- Industry widest video bandwidth of 195 MHz
- Fastest rise time of 3 ns
- Finest resolution of 100 ps
- Crest factor, CCDF, and statistical measurements
- Fast 100,000 measurements per second

More Resources:

Visit info.wtcom.com/aoc-2023 to learn more about T&M solutions for radar systems.