174. BUILT-IN SELF TEST AND CALIBRATION OF ON-CHIP SPECTRAL CHARACTERISTICS WITH LOW COMPLEXITY

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This project presents built-in testing (BIT) architecture and its implementation for On-Chip Spectral characteristics Analyze with low complexity. It enables the frequency response and harmonic distortion characterizations of an integrated device-under-test (DUT) through reconfigurable coherent sampling rate. This accurate FFT analysis approach is based on coherent sampling, but it requires a significantly smaller number of points to make the FFT realization more suitable for on-chip built-in testing and calibration applications that require area and power efficiency. External analog instrumentation is avoided, reducing test time and cost. The proposed on-chip testing scheme use Fast Fourier Transform (FFT) algorithm with fixed size and a simple signal generator synchronized with a modified ADC resolution and the overall accuracy is limited by the ADCs resolution. A general methodology for the use of this structure in the functional verification of a DUT is also provided. The technique was assessed by comparing the simulation results from the proposed method of single and multiple tones with the simulationresults obtained from the FFT of coherently sampled tones. The results indicate that the proper selection of test tone frequencies can avoid spectral leakage even with multiple narrowly spaced tones.

Index Terms — reconfigurable FFT architecture, radix-2kalgorithm, complex coherent sampling, multitone signals.

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