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(54) **MULTIPLE ANALOG-TO-DIGITAL CONVERTER SYSTEM TO PROVIDE SIMULTANEOUS WIDE FREQUENCY RANGE, HIGH BANDWIDTH, AND HIGH RESOLUTION**

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(57) **ABSTRACT**

A composite analog-to-digital converter (ADC) has a low resolution ADC configured to receive and digitize analog data, the low resolution ADC having a low resolution and a high operating speed, one or more high resolution ADCs configured to receive and digitize the analog data, the one or more high resolution ADCs having a resolution higher than the low resolution ADC, and an operating speed lower than the high operating speed of the low resolution ADC, a sample clock generator to provide a sample clock signal to the low resolution ADC and to a clock divider, a mixer to receive the analog data and connected to the one or more high resolution ADCs, a local oscillator connected to the mixer to allow one or more high resolution ADCs to be tuned to sample a portion of a spectrum of the low resolution ADC. A test and measurement instrument contains a composite ADC. A method of operating a composite analog-to-digital converter (ADC), includes receiving an analog signal at a low resolution ADC that operates at a high speed, receiving the analog signal at one or more high resolution ADCs that operate at a resolution higher than the low resolution ADC and at a lower speed than the operating speed of the low resolution ADC, tuning the high resolution ADC to phase align and time align a signal path for the one or more high resolution ADCs to the signal path for the low resolution ADC, producing a spectrum from the low resolution ADC, and producing a portion of the spectrum from the one or more high resolution ADCs.