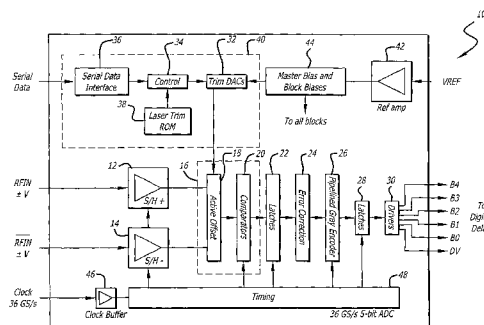




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(54) Title: ADVANCED DIGITAL ANTENNA MODULE



(57) Abstract: An Advanced Digital Antenna Module (ADAM) for receiving and exciting electromagnetic signals. The ADAM ASIC integrates a complete receiver/exciter function on a monolithic SiGe device, enabling direct digital-to-RF (Radio Frequency) and RF-to-digital transformations. The invention includes an improved analog-to-digital converter (ADC) (10) with a novel active offset method for comparators. The novel ADC architecture (10) includes a first circuit (12, 14) for receiving an input signal; a second circuit (18) for setting a predetermined number of thresholds using a predetermined number of preamplifiers (60) with weighted unit current sources (66) in each of the preamplifier outputs; and a third circuit (20) for comparing the input to the thresholds. In the preferred embodiment, the ADC (10) includes trimmable current sources (66). The ADC (10) of the present invention also includes an improved comparator circuit (62). The novel comparator (62) includes split load resistors, pairs R25 (active mode) and R26 and pairs R24 (active mode) and R49, to increase the acquisition time and reduce the regeneration time constant, emitter follower buffers Q85 and Q87 on the latch pair transistors Q61 and Q62 to reduce the capacitive loading on the regeneration node, and cascode transistors Q64 and Q119 coupled to the load resistors to eliminate the output loading effects from the regeneration node. In the preferred embodiment, the invention also includes a novel DDS/DAC architecture (200) with digitally trimmed unary currents and a novel sine lookup and decoder design which overcomes the conventional dynamic range limitations at high conversion rates.