

2 GHz W-CDMA Radio Transceiver

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(ABSTRACT)

A radio transceiver has been designed and built for a W-CDMA experimental system operating at 2GHz. The radio is an RF front-end for mobile terminals. The radio provides the functions of modulation and demodulation to enable transmitting and receiving digital information through the air link. The radio comprises one transmitter in conjunction with transmit power control (TPC), two independent receivers in conjunction with automatic gain control (AGC) and automatic frequency control (AFC), and one common synthesizer. Data exchange between the radio and the baseband processor takes place in an 8-bit digital format. Digital-to-analog converters (DAC) at the transmitter and analog-to-digital converters (ADC) at the receivers provide the interface between the radio and the baseband processor. DACs are also used to convert the 7-bit command codes from the processor to analog signals for the TPC, AGC and AFC. The radio transceiver is designed to meet the stringent requirements imposed by the W-CDMA system. The 70dB TPC enables the adaptive power control for combating the near-far problem. The high linearity of the transmitter provides the use of linear modulation with less than 40dBc adjacent channel power suppression. The 0.03125ppm tuning resolution of the AFC maximizes the receiver sensitivity. The 80dB AGC produces a constant demodulated signal level to the ADC regardless of the RF signal level. This thesis documents the design methodology for this radio transceiver.