WIPCLIP V131C CDPD MODEM TRANSMITTER DESCRIPTION

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1 Tellus WIPclip V131c CDPD Modem

1.1 Transmitter Description and Theory of Operation

The transmitter for WIPclip V131c utilizes the CD8455 transmit modulator chip for frequency up-conversion and IQ modulation. The transmitter is a single conversion design employing direct IQ modulation. An internal synthesizer controls an external tank circuit to generate a fixed frequency of 155.52MHz. The 155.52MHz is mixed with a high-side injection in the CD8455 chip for frequency up-conversion. The RF carrier is fed to the IQ modulator in the chipset for modulation.

The carrier is modulated with I and Q signals from the baseband ASIC. The modulated signal passes through a pre-driver in the CD8455 chip. The differential modulated output signal is fed to a transformer, and pass through a SAW filter before being amplified by an external power amplifier. The signal is amplified to a nominal level of –2 dBW by the power amplifier. The signal from the power amplifier is routed through a frequency duplexer and out to the antenna.

Data from the modem is transmitted in bursts. Each transmit burst includes a ramp-up and ramp-down sequence to limit the frequency bandwidth occupied. The transmit power-level that the modem uses for each burst is calculated based on parameters broadcast by the CDPD base station and the actual RSSI reading at the modem. The WIPclip V131c conforms to power class 3 device per CDPD specification 1.1, hence, it transmits at nominal power levels from -22dBW to -2dBW in 4dB steps.

1.2 Limitation of Spurious Radiation

The WIPclip V131c contains one SAW filter and one duplex filter in the transmit chain to suppress unwanted mixing products and harmonics before reaching the antenna.

The CDPD system employs Gaussian-filtered Minimum Shift Keying (GMSK) modulation with BT=0.5. The pre-modulation Gaussian low pass filter results in increased spectral efficiency. Smooth ramp-up and ramp-down are performed at the beginning and end of each transmit burst to limit the emission spectrum spill over into adjacent channels.

1.3 Limitation of Modulation

The WIPclip V131c uses IQ modulation in the transmitter, which results in high modulation accuracy. I and Q signals from the baseband are combined with the carrier frequency in a quadrature modulator circuit to create the transmit signal. With this implementation, no frequency related adjustment of the modulator is required.

1.4 Limitation of Output Power

The power amplifier in the WIPclip V131c is a two stage GaAs HBT amplifier. Power control for the transmitter is accomplished by varying the bias voltage of the power amplifier through a power controller device. The power control loop has an accuracy of +/- 1dB. The power amplifier is operating from 3.5V to 4.2V DC. The maximum current at +28dBm is less than 1.0A. At the minimum output power of +8dBm the current is less than 0.5A. The maximum output power of the amplifier is less than +30dBm over the temperature range of 0 Celsius to 45 Celsius at 4.2V. This, along with the minimum duplexer insertion loss, ensures that the absolute maximum specified transmitter power of 1W won't be exceeded.

1.5 Transmitter Tune-up Procedure

There is no mechanical tuning needed to adjust the transmitter's frequency, modulation, or power. All tuning is done electronically during manufacturing test to ensure that frequency and power is not only within specification but also centered at optimum values.