SL-1550-T90
2.4GHz A/V Transmitter
Theory of Operation

1.0 Product Description

The SL-1550-T90 is a 2.4GHz Audio / Video FM transmitter designed to transmit NTSV Video and Line Level Audio signals to a wireless receiver.

2.0 Theory of Operation

The SL-1550-T90 transmitter is based upon a highly configurable hardware platform that allows micro-controller control of frequency and power level output. In the case of the SL-1550-T90 transmitter the frequency and power level outputs are configured to comply with FCC Part 90 requirements.

The SL-1550-T90 transmitter operates as follows:

- A micro-controller and user interface is provided to allow the user to select the frequency and power level of operation.
- The micro-controller sets the selected frequency on the frequency synthesizer of an audio / video transmitter module via tan I2C bus.
- The micro-controller in the SL-1550-T90 transmitter is configured to allow a user to associate a frequency between 2.460GHz and 2.472Hz (in 1MHz increments) with one of 32 channels stored in non-volatile memory.
- The micro-controller sets the power level by controlling an RF digital attenuator via a serial data bus. The RF attenuator is digitally controlled to attenuate the fixed output of the transmitter module prior to a 20dB RF amplifier provided.
- The micro-controller in the SL-1550-T90 transmitter is configured to allow the user to modify the power level setting on the SL-1550-T90 transmitter between a nominal value of 1mW and 1W in ten (10) steps.

The following section describes the SL-1550-T90 transmitter hardware design and how the features are accomplished.

3.0 Hardware Platform Design

The SL-1550-T90 transmitter hardware platform consists of the following hardware features:

- Fixed 2.4GHz Audio / Video transmitter module with the following features:
  - I2C frequency control based upon the use of a Zarlink SP5655 frequency synthesizer.
  - Audio / Video modulator
  - Fixed 13dBm RF amplifier

- Digital attenuator with the following features:
  - Serial digital attenuation control between –1.2dB and –33.3dB based upon the use of a Hittite HMC542 digital attenuator

- Two-stage RF power amplifier
  - Stage 1 is based upon the RFMD RF3807
  - Stage 2 is based upon the RFMD RF3809

- Micro-controller
  - Single chip NXP P89LPC932A1FA-S micro-controller

- User Interface
  - LED display of Channel and Power Level settings
  - Dome switch overlay for user control of frequency and power level settings

- Power Supplies
  - DC/DC converter that provides regulated 8VDC power from a 10V-40V power input to the SL-1550-T90 transmitter's RF power amplifiers.
  - 5V linear regulator that provides power to the transmitter module and digital attenuator.
  - 3.3V linear regulator that provides power to the micro-controller.

A block diagram of the SL-1550-T90 transmitter hardware platform is provided as document SL1550T90BlkDia.PDF

4.0 Transmission Characteristics

The SL-1550-T90 transmits a continuous signal modulated by audio and video signal inputs as follows:

- The center frequency is modulated by the video signal inputs
- Sub-carriers of +/- 6.5MHz from the center frequency are modulated by the audio signal inputs.
- The total bandwidth of the transmitted signal is less than 20MHz.

5.0 Antenna Characteristics

The SL-1550-T90 transmitter use a detachable antenna with the following characteristics:

- The transmitter antenna connector on the SL-1550-T90 transmitter is a reverse polarity female SMA (RP-SMA) with a male pin.
- The antenna provided is a tilt and swivel, ¼ wave, 0db gain whip antenna with a reverse polarity male SMA (RP-SMA) with a female pin socket.