

Theory of Operation

Stand Alone HomeLink® Module Description of Operation

The HomeLink® transmitter is a radio frequency transceiver device whose primary function is to determine both frequency and bit code format of typical garage door remote control devices and identically re-transmit them to the original garage door opener receiver.

The on-board microcontroller maintains the operational frequency band as 288MHz to 420MHz, excluding forbidden bands of 303.5 to 305.5MHz, 322 to 335.4MHz and 399.9 to 410 MHz by at least 1 MHz spacing.

The “training” operation is performed by scanning the legal frequencies with a single conversion superheterodyne receiver, looking for valid garage door opener bit code formats. After the training sequence, the frequency, bit code and attenuator setting is stored in non-volatile memory (NVM). The IF of the superheterodyne receiver section is 10.7MHz.

On subsequent power ups, the NVM data is recalled. The VCO is set on the desired RF carrier frequency. The antenna is coarse tuned by sweeping twice around the expected tuning point. It is then fine tuned with 9 pulses. The voltage controlled oscillator (VCO) is then modulated with the appropriate garage door opener bit code from the NVM.

In addition to being frequency and data format adaptive. The HomeLink® transmitter also adjusts the RF amplitude level based upon the duty cycle. During the training sequence, the duty factor of the incoming bit code format is evaluated by the microcontroller determining the greatest amount of on-time in a 100 mS window. The duty factor is then used to adjust the output power in a range of 80% (1.9 dB) to a maximum limit to 30% (10.5 dB) duty cycle. A 9 bit attenuator is adjusted by a closed loop power control algorithm in the microcontroller.

Also, the microcontroller adjusts the output level as a result of the learned frequency of operation. The firmware maintains information relative to the allowable field intensity limits. As the allowable limit increase with frequency of operation the microcontroller adjusts the output level to increase with the increase in transmit frequency.

The LXHL3 variant of the Homelink® standalone transmitter also has Car Area Network (CAN) interface capabilities that allow it to interface with the vehicle's computer. In its unmodified form the module will not power up without the presence of the CAN bus.