

## 0100 BackGround

The Device described herein is a wireless (RF) video game controller transmitter for use with the Sony Playstation. It has 16 channels of operation which the user may choose from, and is used to send button-state data from the controller to a wireless receiver connected to the gaming console.

*Typical Operation*

Typical operation would involve the user turning on the unit to play a game, from several minutes to several hours in duration. When turned on, the unit comes up on a default channel and transmits a continuous stream of data. The user can, at will, change to any other of the predefined 16 channels. Reasons for this might be better reception or to allow multiple users to play at once. When finished, the user can turn off the unit, or the unit will turn off itself if left idle for more than minutes.

## 0101 Configuration

The transmitter RF circuitry consists of a Phase-Locked Loop (PLL) frequency synthesizer, followed by two buffer / gain amplifier stages, and finally, an antenna. The main characteristics of this configuration are shown here, and discussed in the following paragraphs.

Frequency Range	315 - 319.5 MHz
Occupied Bandwidth (3dB)	30 kHz Nominal
Frequency Stability	+/- 20 ppm
Modulation Method	FSK via Direct FM
Output Power:	-47dBm into 50 ohms

**VCO**

The VCO section of the PLL is modulated (frequency shift keyed) directly to produce the modulated output. This is done with a separate control input to the VCO. The maximum frequency of the information signal is 10.4 kHz, while the nominal modulation depth is +/- 15 kHz. The operating range of the VCO is from 315 MHz to 319.5 MHz, operating on channels defined in the table below.

CHANNEL	FREQUENCY (MHz)
CH0	315.0146
CH1	315.2942
CH2	315.5857
CH3	315.9051
CH4	316.1878
CH5	316.486
CH6	316.7903
CH7	317.1131
CH8	317.4065
CH9	317.6907
CH10	318.0141
CH11	318.2986
CH12	318.5862
CH13	318.8936
CH14	319.207
CH15	319.4874

## CHANNEL FREQUENCIES

The VCO is shielded to reduce spurious emissions and lower sensitivity to nearby noise and disturbances.

### Reference Oscillator

A 10.245 MHz crystal oscillator is used to generate the reference frequency for the PLL. It has a stability of +/- 20 ppm, from which the remainder of the system derives its stability.

### Amplifiers

The VCO stage is followed by two amplifiers. These act more as buffers for the VCO than as gain stages, and add very little power to the signal. The final output power is -47dBm into 50 ohms.

### Antenna

The system antenna is a microstrip antenna on the PCB. This keeps the antenna easily and accurately reproducible and protected from damage. No external antenna is required.

### Microcontroller

The system is controlled by a small microcontroller running with a 4.00 MHz oscillator. The microcontroller interface to the RF section includes two parts: modulating the VCO with data to be transmitted; and loading the PLL synthesizer with data to select frequency of operation.

### Power Supply

The power supply for the system (not shown in the diagram) is a switching supply with switching frequencies ranging from 100 to 300 kHz.