Interface Definitions

Block	Input	Output
User Interface	Physical interface (pressing buttons, changing slider/knobs)	Visual feedback to indicate present state (what the box is doing) Resistance changes to control voltages of the RGB LED
RGB LED	3.3V and resistance changes	Color changing light dependent on resistance
State Machine	One-bit binary from the buttons	Proper arrangement of connections for a given state
Memory	Discrete-time audio signal values to solid-state memory while in “write”state 5V from FPGA Controller to solid-state memory	Two 16-bit binary output to control the column and row of the Led matrix Amplitudes of frequencies to be sent to the VCO
LED Matrix Visualizer	Two 16-bit binary inputs that represent the column and row of the Led matrix	The light displays the amplitude of the frequency bands
Microphone Driver	5V from FPGA controller, Audio input while in “write” state (100 Hz – 5 kHz)	Amplified analog signal
ADC	5V supply, Clock signal (12kHz) and Chip Select signal from the FPGA controller. The amplified analog signal from the microphone.	Discrete-time 12-bit digital signal
FFT	The discrete-time digital audio signal from the ADC	A 16-bit binary output represents the amplitude of the frequency

VCO	Frequency domain coefficient magnitudes.	Sinusoidal, continuous-time signal with the frequency of the dominant (max voltage) coefficient to the audio driver.
Speaker Driver	Pre-amplified audio signal from VCO while in “read” state.	Audio output through the speaker while in “read” state.