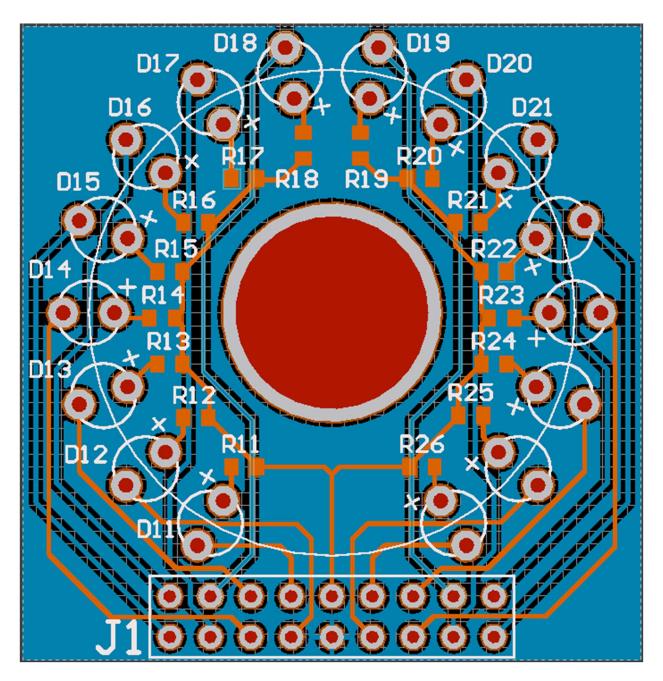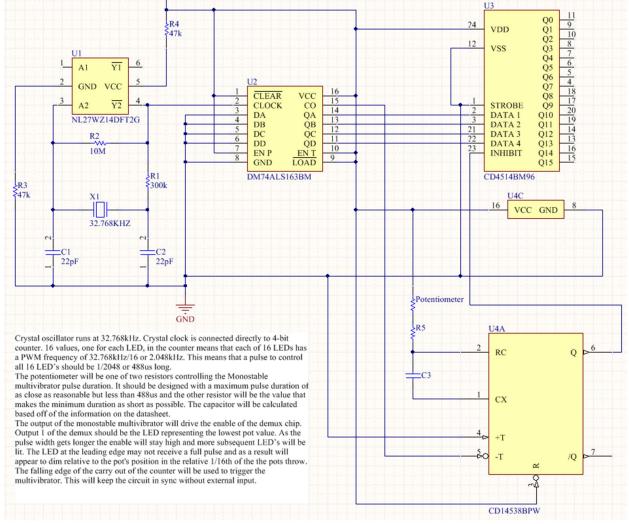The first board for the LEDs is 1.230" x 1.2". I imagine with you're experience you could find room to get the 30 mil back it it's an issue, but I try to keep my clearances reasonable because I have only had a half dozen or so boards actually made. I initially designed for a 1.6k 1% 0603 current limiting resistor but the 1.69k 1% 0603 house part from Macrofab should do fine. I also put in a ground plane just because it's for an audio device, but as far as the LEDs are concerned I don't think it does very much. Here's the board I designed.

I'm nowhere near as far on the second driver board. Basically, an oscillator drives a counter that controls which output is active on a demuxer that drives a buffer for the LEDs. The input value

of the dumuxer is controlled by a monostable multivibrator with a pulse width that is controlled by the potentiometer. If the pot is turned up higher then the pulse is longer and more of the LEDs are lit as a result. This leads to the happy coincidence that the leading LED will dim relative to the pot's position within it's respective 1/16th of the pots 300 degree throw (i.e. if the pot is turned to 20 degrees the second LED will be dimly lit, but at 35 degrees it will be at almost full intensity). Everything is controlled by the counter and the carryout is used for synchronization. I focused on TSSOP packages so that a mere mortal stands a chance at hand soldering the board, but space savings could certainly be made with QFN packages. All of this could be done in an MCU, but a discrete solution that doesn't require code seemed like the better choice to me.

I got close on the schematic, but didn't even start the board layout. The buffer is not pictured because you could do the same thing with an array of transistors, but I didn't have time to figure out which option fit better on the board.

Crystal oscillator runs at 32.768kHz. Crystal clock is connected directly to 4-bit counter. 16 values, one for each LED, in the counter means that each of 16 LEDs has a PWM frequency of 32.768kHz/16 or 2.048kHz. This means that a pulse to control all 16 LED's should be 1/2048 or 488us long.

The potentiometer will be one of two resistors controlling the Monostable multivibrator pulse duration. It should be designed with a maximum pulse duration of as close as reasonable but less than 488us and the other resistor will be the value that makes the minimum duration as short as possible. The capacitor will be calculated based off of the information on the datasheet.

The output of the monostable multivibrator will drive the enable of the demux chip. Output 1 of the demux should be the LED representing the lowest pot value. As the pulse width gets longer the enable will stay high and more subsequent LED's will be lit. The LED at the leading edge may not receive a full pulse and as a result will appear to dim relative to the pot's position in the relative 1/16th of the the pots throw. The falling edge of the carry out of the counter will be used to trigger the multivibrator. This will keep the circuit in sync without external input.

The tentative BOM looks like this:

NL27WZ14DFT2G Inverter - $0.1741 each @ 10+ qty

AB26T-32.768KHZ Crystal - $0.1588 each
DM74ALS163BM Counter - $0.0399 each @ 10+ qty
CD4514BM96 Demux - $0.5785 each @ 10+ qty
CD14538BPW Multivibrator - $0.3952 each @ 10+ qty
MC74LCX16244DTG Buffer - $0.3968 each

Total $1.7422 in IC's per unit + ~25 jelly bean components like standard value 1% resistors and standard value caps. As far as LEDs go I designed for the TLLG4400 from Vishay which is $0.1324 each @ 250 qty, but I imagine there are more economic ways to find 400 standard green T-1 LEDs. The current limiting diode is pretty conservative so you could even use yellow and red LED's to indicate that a pot is turned all the way up.

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