



APPLICATION NOTE 4442

Logarithmic LED Panel Display Has 72dB Range

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Abstract: This application note presents a simple, stand-alone panel-display circuit that drives a 12-LED logarithmic column. The LED column is a 12-step log indicator with 6dB step height, forming a total column range of 72dB. The circuit's accuracy and stability are defined by the specifications for the design's ADC. The MAX1276 12-bit ADC is featured.

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Panel-level logarithmic-column displays are usually built in one of two configurations: an analog logarithmic converter and a column-display ADC; or the combination of a high-resolution ADC, a processor-controlled logarithmic algorithm, and an LED or LCD column driver.

There is a simpler, all-digital alternative consisting of a serial-output ADC and some timing and display electronics (**Figure 1**). A stand-alone circuit, it requires no trimming (as analog versions do), no microcontroller, and no software. The signal to be displayed is applied to a 12-bit ADC (IC1, the [MAX1276](#)). For the circuit shown, that signal can range from zero (no LED on) to +2.048V (all LEDs on), with the first LED coming on at +1mV.

When triggered by a short positive pulse at CNVST, the MAX1276 begins a conversion, clocked by the signal at SCLK. Its output (DOUT) is clocked by the rising edge of SCLK and starts with four leading zeros, followed by the 12-bit conversion result, MSB first. Thus, one conversion result requires 16 clock pulses at SCLK.

The display is a vertical stack of 12 LEDs in which the top LED represents the MSB. During operation, the circuit scans each conversion result as it is generated (MSB first, as described above). It notes the first bit with a value of "1," and then proceeds to illuminate that LED and all those below it. The result is a logarithmic column in which the input-voltage change necessary to move the column one step up or down is double or half the current input value (a 6.02dB step). The number of steps available equals the ADC's resolution (12 bits in this case).

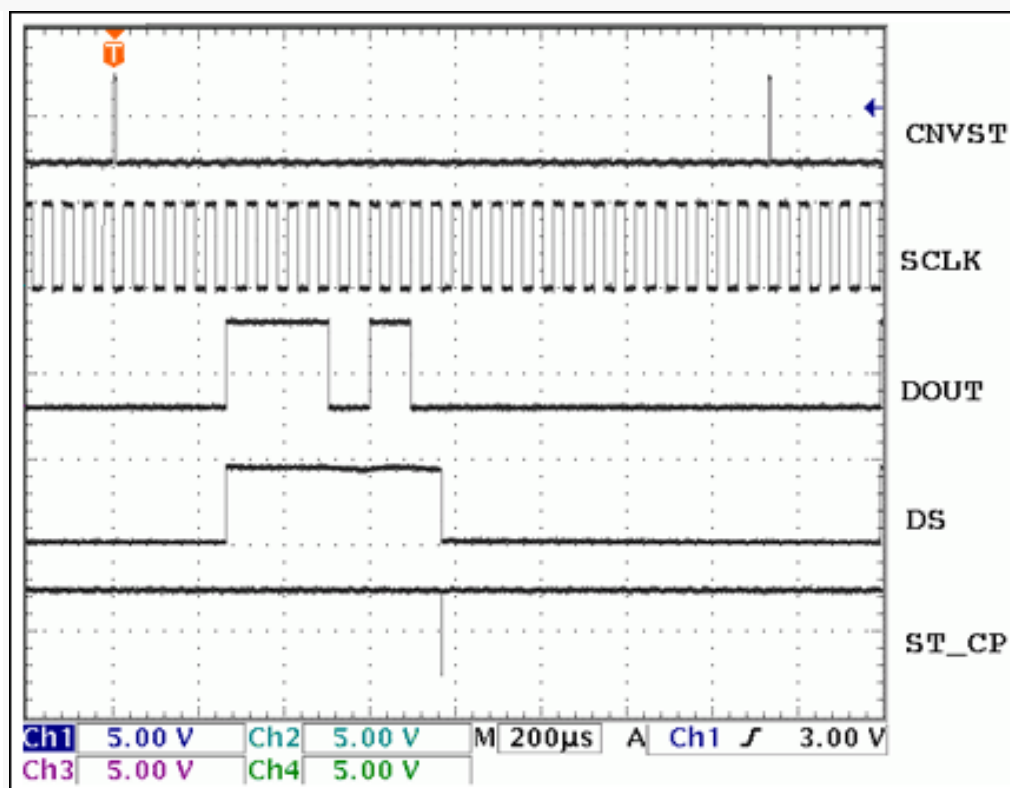


Figure 2. Timing for the Figure 1 circuit. CNVST: MAX1276 conversion trigger signal; SCLK: MAX1276 conversion clock, and 74HC595 shift clock; DOUT: MAX1276 conversion data out; DS: 74HC595 shift data input; ST_CP: 74HC595 shift-register to parallel-register transfer clock pulse.

Thus, the LED column is a 12-step log indicator with 6dB step height, forming a total column range of 72dB. Its accuracy and stability are those defined by the specifications for the MAX1276. The sampling rate for the display is about 2.5kHz with the component values shown.

Related Parts

MAX1276: [QuickView](#) -- [Full \(PDF\) Data Sheet](#) -- [Free Samples](#)

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