Tiny Programmable Oscillator Operates From 5 kHz To 20 MHz

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By merging a digital potentiometer with an oscillator chip, a very small programmable oscillator (1 µMAX and one SOT-23 package) can be realized. In addition to consuming very little board space, the circuit requires only three signals from a microprocessor for control *(see Fig. 1)*.

The MAX5160 from Maxim is a 200-kΩ digital potentiometer with 32 taps. To move up to the next tap, set the UP/DOWN input high and pulse the increment input low. To move down, set the UP/DOWN low before pulsing the increment input.

The LTC1799 is a programmable oscillator from Linear Technology. The frequency of oscillation is inversely proportional to the value of the resistor between V+ and the SET pin. The chip contains an internal divider, which is controlled by the DIV pin. The relationship between the divide ratio and the input on DIV is given in the table.

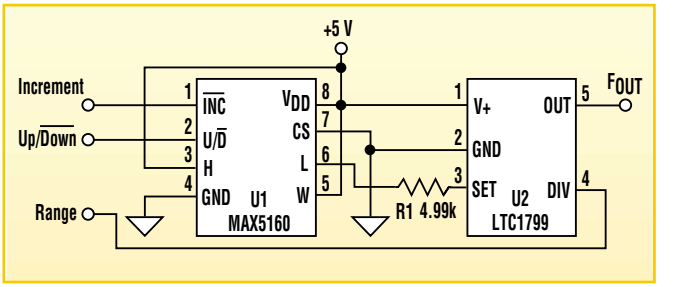
The equation for the oscillator frequency is:

$$F_{OSC} = 10\text{MHz}\left(\frac{10000}{NR_{SET}}\right)$$

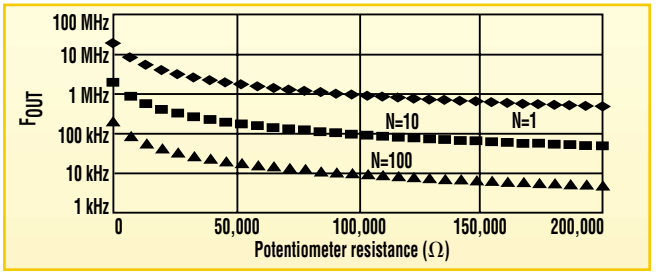
Where N is the divider value shown in the table.

A plot of this equation for each value of N versus each of the tap locations on the digital potentiometer can be seen in Figure 2. Note that there is some overlap between the curves for each value of N.

To satisfy the minimum R_{SET} requirements for the LTC1799, resistor R1 was added in series with the digital potentiometer. The circuit can be further simplified by setting the DIV input to a fixed value, which restricts operation to a narrower output range.



1. This tiny programmable oscillator (one µMAX and one SOT-23 package) needs only three signals from a microprocessor for control.



2. The output frequency for each divider value versus each tap location on the digital potentiometer is shown.

DIVIDER VALUES

DIV input	Internal divider value (N)
Ground	1
High impedance	10
V+	100

ideas wanted

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