



SIMPLE CIRCUITS

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Reviewing a Voltage Converter Chip – MAX681

Greetings everyone and welcome to Simple Circuits, for the September – October issue of the IMSA Journal.

In this issue, I have chosen to review a voltage converter chip called the MAX681. The MAX681 is manufactured by Maxim Integrated Products and is actually a self contained, dual charge pump voltage converter which is capable of providing +/- 10VDC from a single +5V logic supply.

The actual input voltage range is from 2 to 6 VDC producing output voltages of +/- 4VDC to +/- 12VDC respectively. The device can source up to 10 mA of output current when driven with a +6VDC input.

Each converter has a source output impedance of approximately 150 Ohms (5VDC input at room temperature), and the output voltage will decrease as greater current is drawn by the load on either charge pump output circuit.

This brings up a very good point... The MAX681 is not a voltage regulator. It simply provides positive and negative output voltages for low current applications. Voltage regulation must occur external to the device.

The MAX68X series of voltage converters come in several form factors. Some devices, such as the MAX680, require external electrolytic capacitors to complete their charge pump circuitry, while others, like the MAX681, contain the required capacitors within the IC package itself. This simplifies the PC board layout and reduces the amount of real estate required by the charge pump circuit.

Please see figure 1 for connection of the MAX681 voltage converter.

The charge pump circuit consists of 8 CMOS power MOSFET switches, driven by an internal 8 KHz oscillator, running at a 50% duty cycle. The switching nature of the device provides for a 95% voltage conversion efficiency and an 85% power conversion efficiency.

The MAX681 typically draws around 500 micro amps of supply current, when driven with 3 Volts @ 25C, making it an excellent choice for portable instrumentation devices and solar powered applications. It can however, draw up to 3 mA when driven with 5VDC and operated throughout a full industrial temperature range (-40 to +85C). The MAX681 comes in two standard temperature ranges, 0 to 70C and -40 to +85C.

The MAX681 comes exclusively in a 14 pin plastic DIP package, while its cousin, the MAX680 comes in a variety of package styles and an extended military temperature range of -55 to +125C in the CERDIP package configuration.

Please use caution when powering circuitry with switching voltage converters. For example, switching noise from the converter can sometimes be coupled, via the op amp power supply

pins, into audio signals being amplified or processed. External voltage regulation and filter circuitry may be required to eliminate the interference.

Placement of the components on the printed circuit board may also be of consideration, especially when higher frequency switchers are used. Some voltage converting devices switch internally at rates into the 100's of KHz!

The MAX681 is available directly from MAXIM on their website, while the MAX680 can be purchased from Digi-Key for between \$4 and \$5 dollars US, in small quantities (DIP Pkg.)

As always, read the data sheet and application notes carefully before implementing this device. There is some excellent information available on external regulation, the paralleling of devices to reduce effective output impedance and even a detailed description of the internal charge pump circuit operation, should anyone be interested down to that level.

Until next time,

Take care out there!

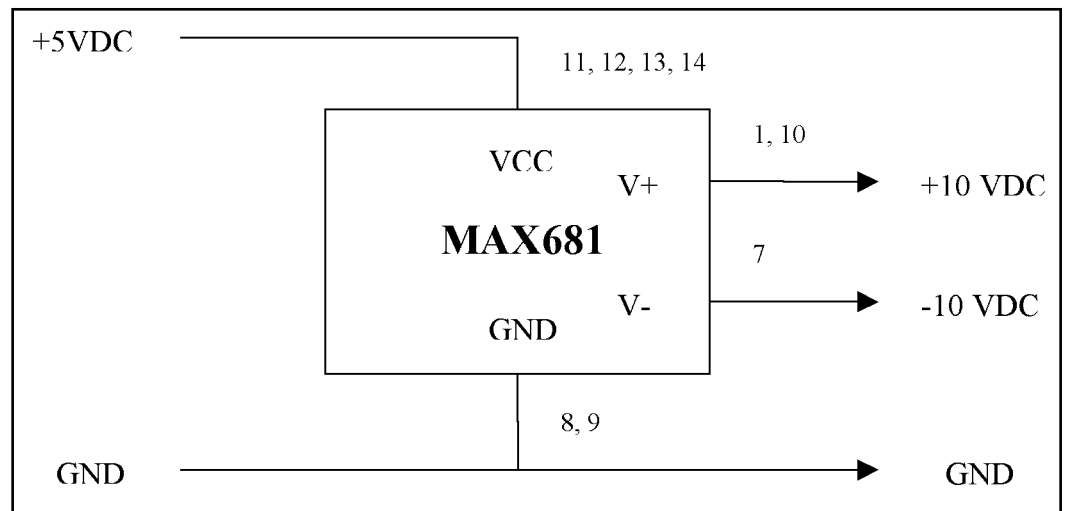


Figure 1