



APPLICATION NOTE 1780

## Octal Trimpots Offer Rail-to-Rail Adjustments

*Abstract: This design note shows how an octal digital-to-analog converter (DAC), the MX7228, works with a voltage-doubler charge pump, the MAX660, to provide rail-to-rail adjustment of eight output voltages.*

The octal D/A converter circuit of Figure 1 operates on 5V and provides eight output voltages, each digitally adjustable from supply rail to supply rail (0 to 5V). Each output has a resolution of 20mV/LSB. The D/A chip (IC<sub>1</sub>) requires 3.5V of headroom between its V<sub>DD</sub> and reference voltages, but a voltage-doubler charge pump (IC<sub>2</sub>) removes this limitation by generating an approximate 10V supply for V<sub>DD</sub>. All the converter references are connected to the 5V supply.

IC<sub>1</sub>, which appears as a memory to the controlling  $\mu$ P, draws less than 20mA of quiescent current. IC<sub>2</sub> is a high-current charge pump that normally operates as an inverter. Configured as shown, it doubles the 5V input to an unregulated 10V output and provides an output impedance of less than 10 $\Omega$ . It can deliver 100mA, which allows the eight D/A converters to issue their maximum output currents simultaneously ( $8 \times 5\text{mA} = 40\text{mA}$ ).

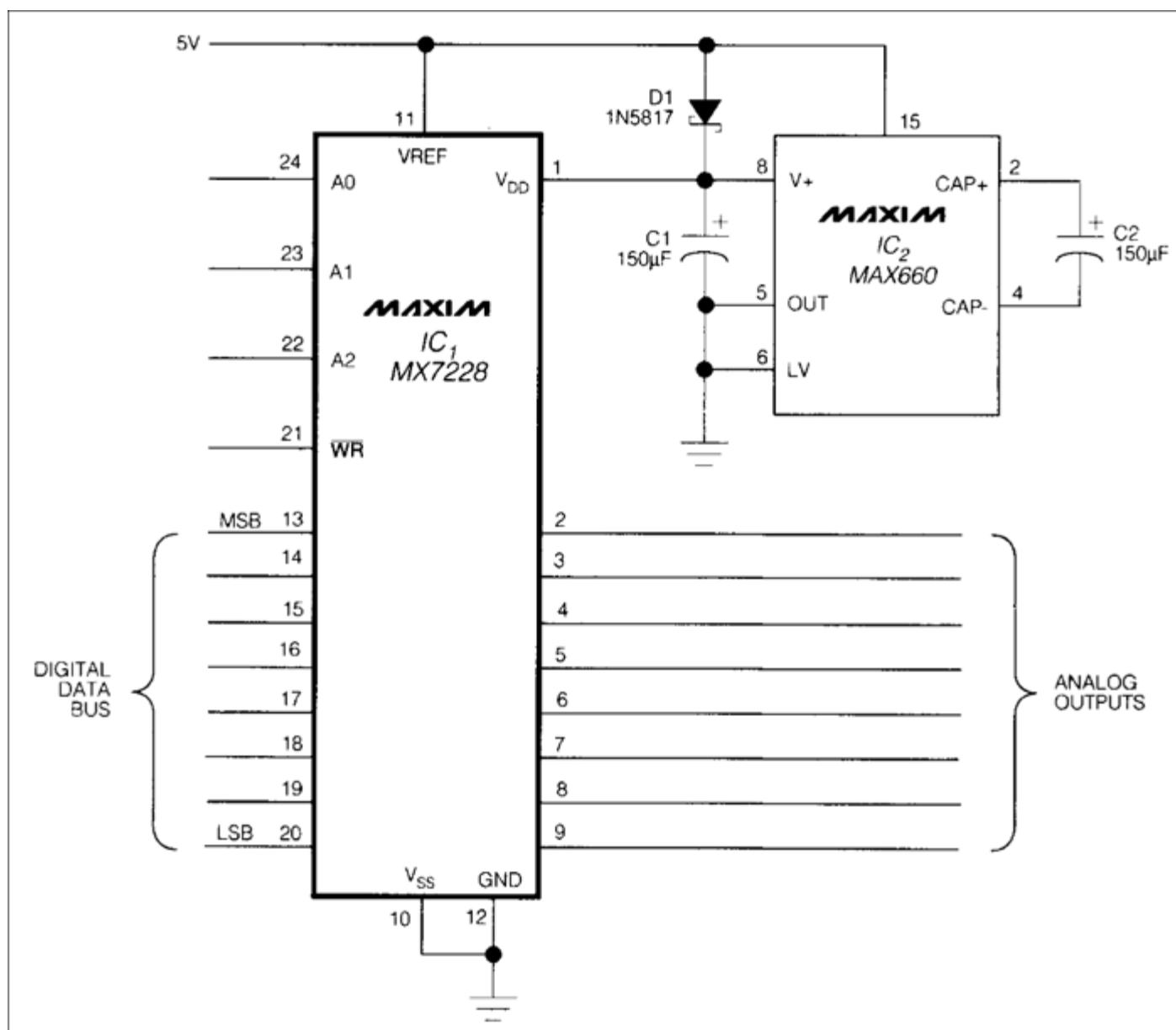


Figure 1. Because a voltage-doubler charge-pump IC supplies 10V to the octal D/A converters' references, the converter outputs can range from rail to rail (0 to 5V) of the applied supply voltage.

#### Related Parts

[MAX660 CMOS Monolithic Voltage Converter](#) -- [Free Samples](#)

[MX7228 CMOS, Octal, 8-Bit DAC](#) -- [Free Samples](#)

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