Keywords: DS1864, current DAC, voltage DAC, current to voltage

APPLICATION NOTE 4075

How to Use the DS1864's Current DACs as Voltage DACs

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Abstract: This article describes how to convert the current DACs in the DS1864 SFP laser controller/monitor to a voltage output by using standard components.

The Current DACs

The DS1864 contains two 8-bit current-sink DACs with 1.5mA or 0.5mA selectable full-scale range. The DAC outputs must be at a voltage level between 0.7V and the DS1864's V_{CC}.

Current-to-Voltage Conversion

An operational amplifier in differential amplifier configuration is used to convert the 0.5mA full-scale current-mode output to 1V full-scale voltage-mode output (**Figure 1**).

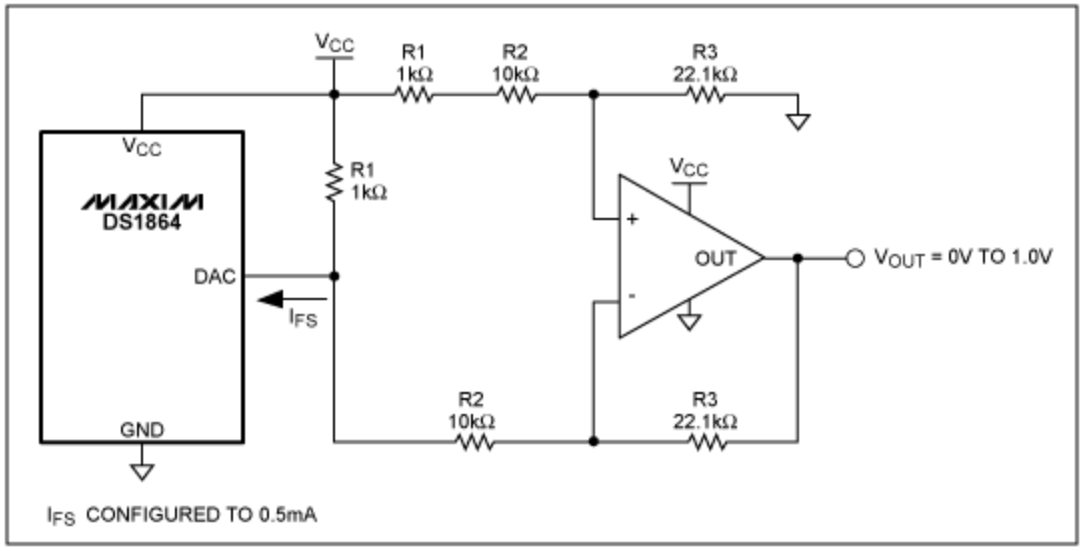

Figure 1. Circuit shows current-to-voltage conversion.

Compact Solution

Using a chip-scale packaged op amp and 0201 resistors will provide the most compact solution. The MAX4233 is a two-channel op amp available in 1.5mm x 2mm 10-bump UCSP™.

Output Voltage Calculation

The output voltage is calculated in Equation 1.

$$V_{OUT} = \frac{(I_{DAC} \times R1)(R3)}{R1 + R2} \qquad \text{(Eq. 1)}$$

Using the values shown in the Figure 1 drawing, the maximum output voltage is 1.005V when the DAC current is 0.5mA. To minimize offset and gain errors, 1% tolerance resistors should be used. Further, R1 should be selected so that the voltage at the DAC pin never falls below 0.7V.

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Related Parts		
DS1864	SFP Laser Controller and Diagnostic IC	Free Samples
MAX4233	High-Output-Drive, 10MHz, 10V/µs, Rail-to-Rail I/O Op Amps with Shutdown in SC70	Free Samples

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