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APPLICATION NOTE 3525

Resistor Calculator for the DS3906

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Abstract: The DS3906 contains three variable resistors that have a pseudolog response. External resistors can be used in parallel with the DS3906's resistors to achieve a linear response having small step sizes. This application note, along with the associated spreadsheet, demonstrates the ability to achieve a variable resistance with an effective linear response when used in parallel with external resistors. The spreadsheet also allows users to experiment with different values of external resistors to suit their particular application.

The supplemental spreadsheet for this application note was developed in Microsoft Excel. Users can download the file, which contains two worksheets.

The first worksheet, "WithoutExtR," contains the nominal values of the internal variable resistors for each of the programmed steps. This is simply a soft copy of the table in the DS3906 data sheet. The worksheet also calculates values of these resistors after considering the maximum variation (due to process changes) that the resistances can have from the nominal values. A plot of the nominal resistance response without any external resistors is shown in **Figure 1**. Since R0 and R1 have the same response with respect to the resistor settings, only one graph is provided for both (R0,1).
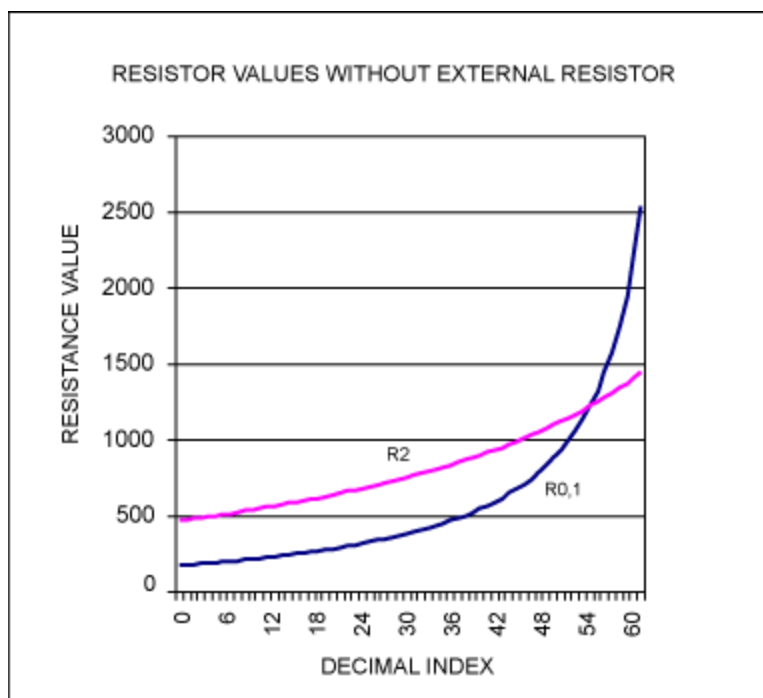
Figure 1. Nominal resistance response without external resistors.

The second worksheet, "WithExtR," contains the values of the variable resistors. It also shows the effective resistance calculated using an external resistor in parallel with the internal DS3906 resistors for each of the programmed steps. The effective resistance is then graphed (**Figure 2**) to allow users to see the effective response, and also to provide the value of the effective resistance for each programmed step.
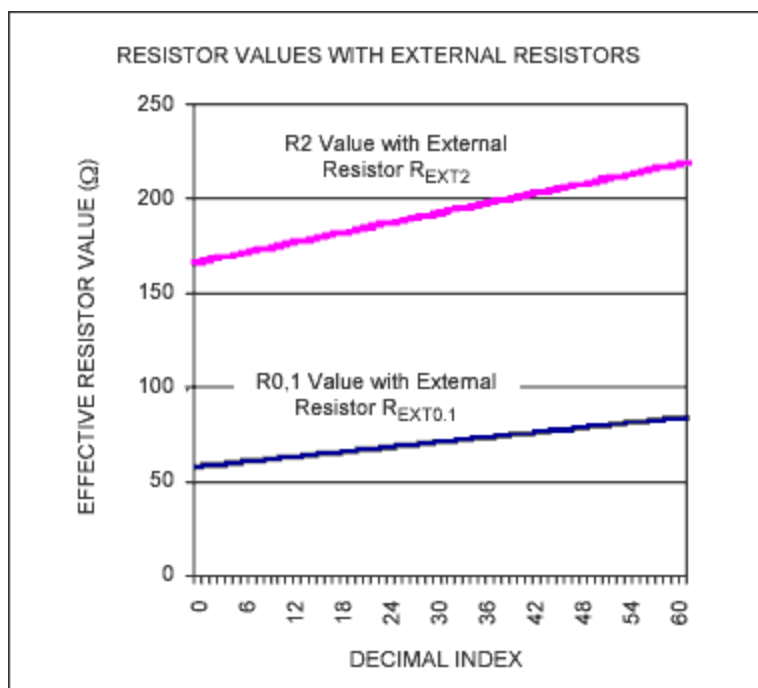

Figure 2. Effective resistance calculated using an external resistor in parallel with the internal DS3906

resistors.

User Inputs

The spreadsheet gives the user the ability to modify the external resistors (as shown below). Because resistors R0 and R1 internally have the same response, the effective response will be the same for any given external resistance. Therefore, only one value for the external resistance (REXT0,1) is provided that will show the effect on both.

External R0,1 Value (REXT0,1)	105
External R2 Value (REXT2)	310

Conclusion

The supplemental spreadsheet for DS3906 resistance calculation enables users to vary the external resistance and easily determine the value of the effective resistance obtained for each programmed step.

Related Parts		
DS3906	Triple NV Low Step Size Variable Resistor Plus Memory	Free Samples

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