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## APPLICATION NOTE 4499

# Miniature Circuit Converts Negative Inputs to Positive Outputs

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*Abstract: You can obtain a precise, positive output voltage from a negative voltage supply by teaming a boost converter with a linear regulator. The input and output capabilities of the circuit depend on the allowable input/output voltages of ICs U1 and U2.*

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You can obtain a precise, positive output voltage from a negative voltage supply by teaming a boost converter with a linear regulator as shown in **Figure 1**. The input and output capabilities of the circuit depend on the allowable input/output voltages of ICs U1 (**MAX8574**) and U2 (**MAX8875**). In this case, U1 and U2 are chosen to convert a -5V input voltage to a +3.3V output voltage.

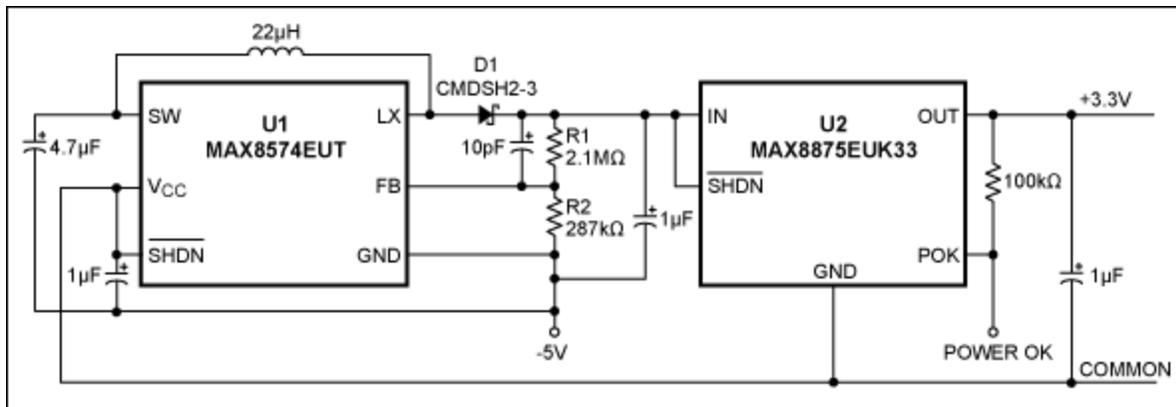


Figure 1. This 2-IC circuit converts a negative 5V input to a positive 3.3V output.

U1 is a boost converter that accepts -5V when its  $V_{CC}$  pin is connected to the common ground (the ground of the negative power supply input). Voltage divider R1/R2 at the output of this U1 circuit provides the feedback necessary to set the output voltage 10.5V above U1's GND pin. With the FB threshold voltage factory-set to 1.226V, you can choose R1 and R2 using this equation:  $(1.226V/R2)(R1 + R2) = 10.5V$ . Current through the R1 and R2 resistors should be at least  $2\mu A$ . The U1 output (U2's IN) is 10.5V above -5V, which is +5.5V with respect to the common ground.

U2, a linear regulator whose GND pin connects to the common ground, accepts input voltages up to +6.5V. Its output is factory set to +3.3V. **Figure 2** shows the Figure 1 output voltage versus output current for input voltages of -4.5V, -5V, and -5.5V.

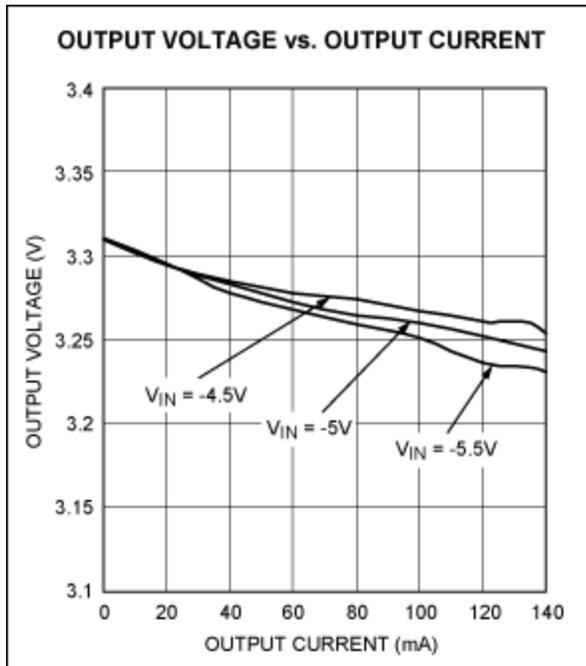


Figure 2. Figure 1 output voltage vs. output current, for source voltages -4.5V, -5.0V, and -5.5V.

#### Related Parts

<b>MAX8574</b>	High-Efficiency LCD Boost with True Shutdown	
<b>MAX8875</b>	150mA, Low-Dropout Linear Regulator with Power OK Output	<a href="#">Free Samples</a>

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