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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.

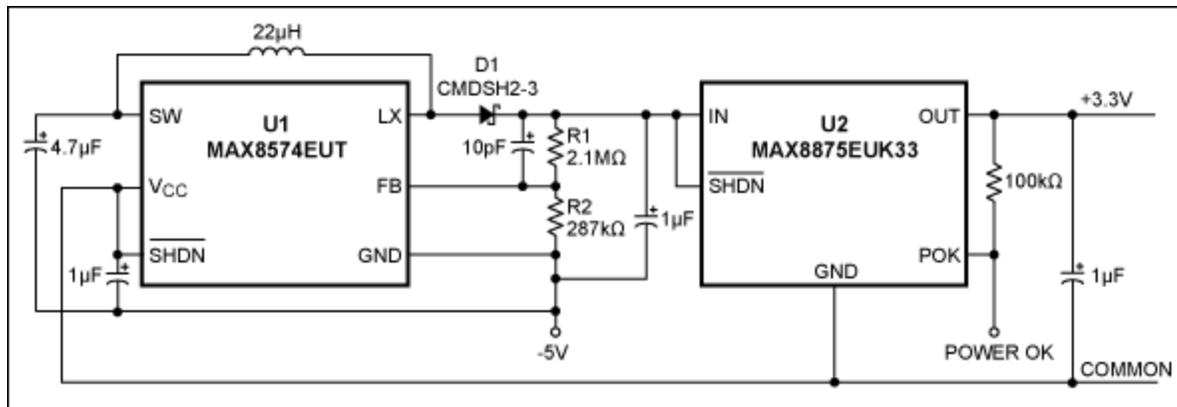


Figure 1. This 2-IC circuit converts a negative 5V input to a positive 3.3V output.

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.

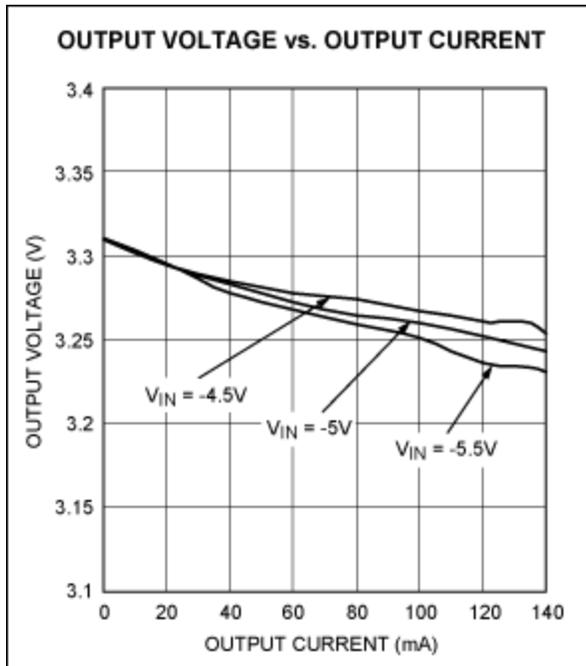


Figure 2. Figure 1 output voltage vs. output current, for source voltages -4.5V, -5.0V, and -5.5V.

Related Parts

MAX8574	High-Efficiency LCD Boost with True Shutdown	
MAX8875	150mA, Low-Dropout Linear Regulator with Power OK Output	Free Samples

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