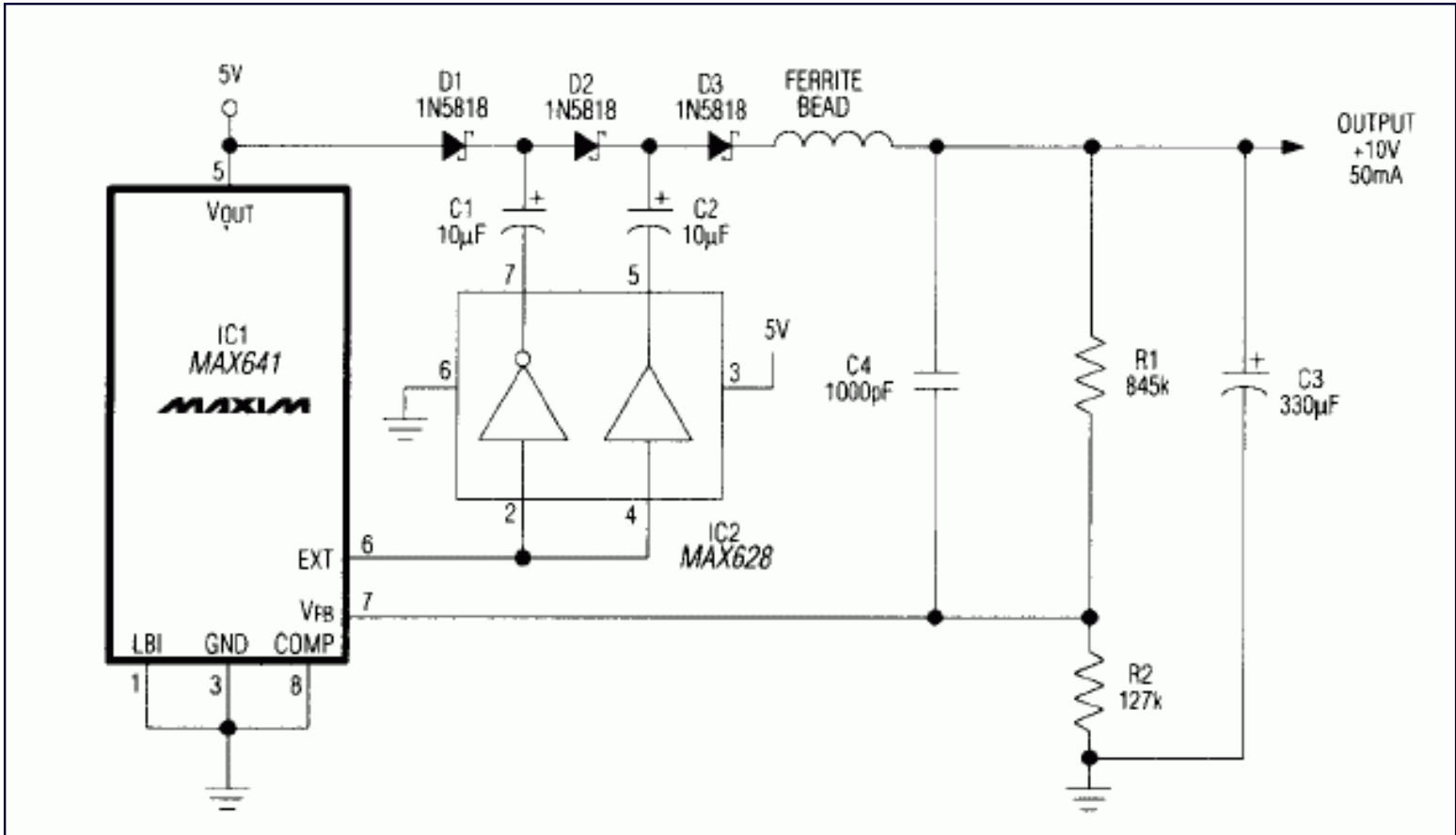


APPLICATION NOTE 35

# Regulated Charge Pump Delivers 50mA

The DC-DC converter circuit of **Figure 1** substitutes a voltage tripler in place of the external inductor and diode normally associated with switching regulator IC1. Inverting and noninverting drivers in the MOSFET-driver chip (IC2) activate a diode/capacitor tripling network (D1-D3, C1-C3). In comparison with charge pumps based on single-polarity drivers, the buffer/inverter combination of IC2 enables this circuit to deliver more current with fewer parts.



The diode-capacitor tripler network in this step-up switching regulator develops 10V from a 5V input, and delivers 50mA.

A 50kHz oscillator within IC1 produces the EXT signal (pin 6), which IC2 converts to drive signals (180° out of phase) for the tripler. The resulting charge-discharge action in the capacitors recharges C3 toward 10V every 20µs. The ferrite bead limits output ripple to about 20mV<sub>p,p</sub> for a 50mA load.

Conversion efficiency (**Figure 2**) is about 70% for the 5V-in, 10V-out configuration shown. You should use low-ESR capacitors and Schottky diodes to assure the 50mA-output capability. Resistors R1 and R2 determine V<sub>OUT</sub>, which can range as high as 15V with proportionally lower output current:  $R_1 = R_2[(V_{OUT}/1.31V)-1]$ .

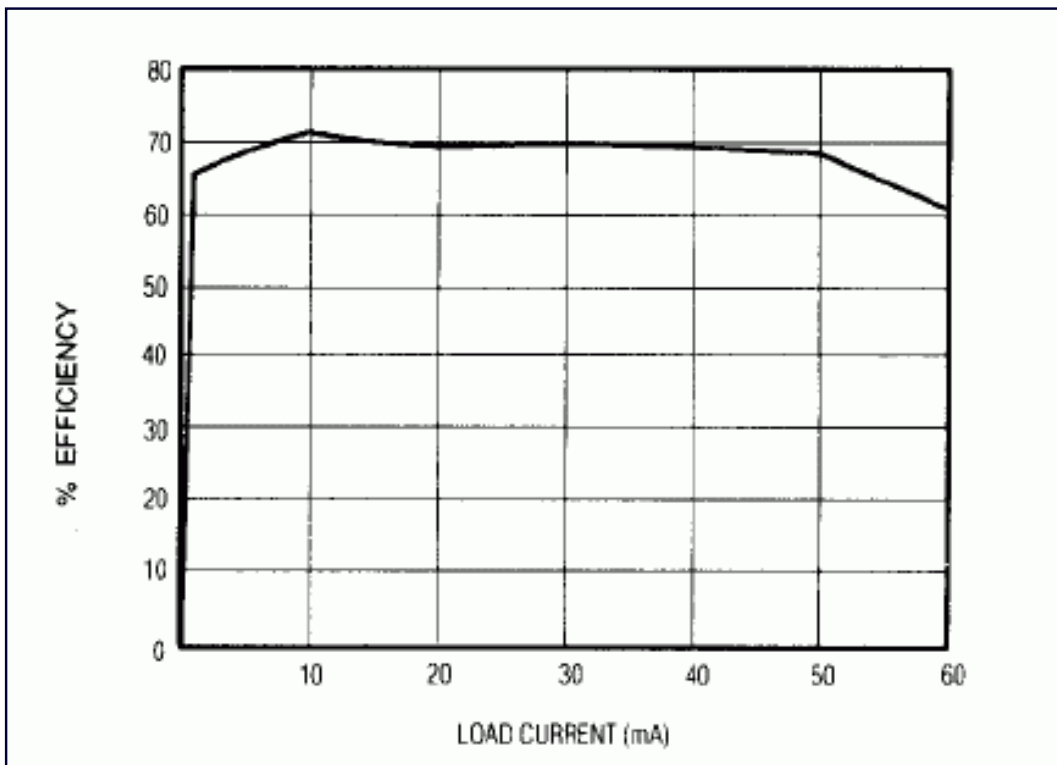


Figure 2. DC-DC conversion efficiency in the Figure 1 circuit varies with load current as shown.

Application Note 35: <http://www.maxim-ic.com/an35>

#### More Information

For technical questions and support: <http://www.maxim-ic.com/support>

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#### Related Parts

MAX641: [QuickView](#) -- [Full \(PDF\) Data Sheet](#) -- [Free Samples](#)

AN35, AN 35, APP35, Appnote35, Appnote 35

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