LM2623 General Purpose, Boost Converter Circuit

National Semiconductor
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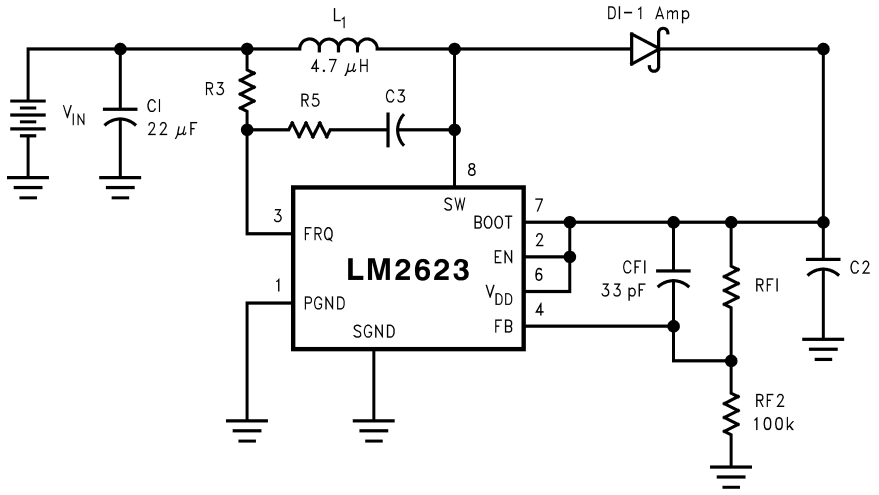
The next page shows the generic application circuit for LM2623 boost converters. The LM2623 boost converter circuits are very conventional, except for the ratio adaptive circuitry that is used to change the duty cycle. These components adjust the duty cycle to match it to the input/output voltage ratio requirements. R3 provides the drive current for the oscillator (frequency increases with lower resistance values). C3 and R5 provide the duty cycle adjustment. The default duty cycle when C3 and R5 are left out is about 17%. The value of C3 generally determines the total amount of charge transfer and resulting duty cycle adjustment. Smaller R3 values require larger C3 values (more charge transfer) to achieve the same duty cycle adjustment percentage. When more than 17% is necessary and it is not necessary to adjust the duty cycle dynamically (as the input to output voltage ratio changes), R5 can be omitted. Adding R5 allows the duty cycle to change as the input to output voltage ratio changes due to the battery discharging in portable applications. In applications where the fresh or fully charged battery voltage is close to the output voltage (2 cells generating 3.3V), the optimum duty cycle changes dramatically as the battery discharges. Use of the correct R5 in these situations will optimize the duty cycle for the voltage ratio and minimize the ripple due to overshoot caused by stored energy in the coil.

The table of values below the application circuit on the bottom of this page should produce good performance for the application requirements stated. Recommended inductor values are based on input voltage, load current and operating frequency. 4.7 µH works well in most LM2623 two cell applications. 6.8 µH works well in most LM2623 LiIon or three cell applications. RF1 and RF2 set the output voltage by dividing the output voltage for comparison to the reference at the pin 4 FB pin. CF1 couples the AC ripple from the output directly into the comparator at pin 4. When in regulation, this triggers the regulation limit each switching cycle. Triggering this limit allows the comparator to make the voltage comparison from the same direction (above the limit) each switching cycle. This minimizes the hysteretic component of ripple. A 68 µF or larger output capacitor is recommended to minimize ripple resulting from overshoot due to stored energy in the coil. The rectifier diode should be selected as a function of peak currents and efficiency requirements.

LM2623 Boost Converter Circuit
Typical Applications
Digital Cameras



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V_{IN}	Load Type	V_{OUT}	RFI	R3	R5	C3	C2
2 Cells	Analog/Digital	3.6V	182k	90k	35k	3.3 pF	100 µF Tant + 4.7 µF Cer
2 Cells	Motor Drive	5V	300k	90k	22k	4.7 pF	68 µF Tant
3 Cells or Li I	Motor Drive	5V	300k	150k	35k	4.7 pF	68 µF Tant

Notes

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