

Low Noise Boost VCO Power Supply for Portable Applications

by Ted Henderson

Introduction

Many portable RF products use voltage controlled oscillators (VCOs) to generate the RF carrier frequency. These applications often require low noise VCO power supply voltages that are greater than the primary battery supply. A DC/DC converter powering a low noise linear regulator is often used. Unfortunately, there are several disadvantages to this solution. The DC/DC converter tends to produce noise that may not be rejected by the regulator, resulting in regulator output noise far greater than the thermal noise levels. The linear regulator may require a large output


compensation capacitor with specific ESR requirements. The board area for both devices and support components can be large. The LTC1682 charge pump DC/DC voltage converter has been designed to minimize these issues. The charge pump and linear regulator have been mutually optimized for minimum regulator output noise. The linear regulator was designed to operate with several different types of output capacitors including small, low value, low ESR ceramic capacitors. The charge pump voltage converter and low dropout linear regulator are combined on one

die and assembled in an extremely small MS8 package. Both fixed and adjustable output voltage versions are available to cover the widest possible output voltage range.

VCO Power Supply

Figure 1 shows the LTC1682 generating a 4.2V low noise power supply for a 900MHz VCO with an input voltage range of 2.5V to 4.4V. Figure 2 shows the close-in phase noise of the VCO operating open loop and Figure 3 shows the typical peak-to-peak noise voltage at V_{OUT} .

Conclusion

The new LTC1682 family of charge pump DC/DC voltage converters represents a complete low noise solution for VCO power supplies. A wide input voltage range of 1.8V to 4.4V, low dropout voltage, low quiescent current, low external parts count and small board area make these devices ideal for portable applications. 

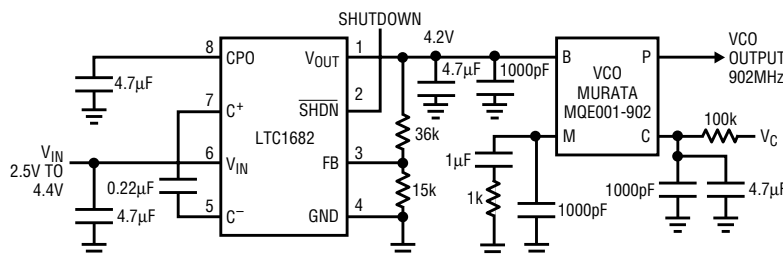


Figure 1. 4.2V VCO power supply

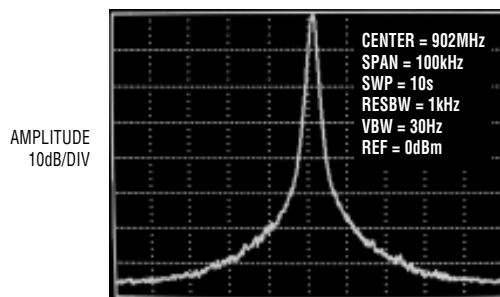


Figure 2. Close-in phase noise

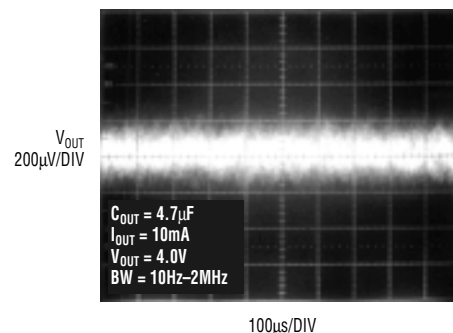


Figure 3. Output noise voltage

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