DC436A – LT1765 1.25MHz 3A Peak Switch Current Monolithic Step-Down Converter

Description

Demonstration Circuit DC436A is a 1.25MHz 3A monolithic step-down DC/DC switching converter using the LT1765. With its fast switching speed, 3A internal power switch, and wide input voltage range, the LT1765 is a very versatile and powerful IC for dc/dc converters that require compact space and a wide variety of input voltage ranges. The constant 1.25MHz switching frequency allows all of the components to be very small, surface mount devices. The current-mode control topology creates fast transient response and good loop stability with a minimum number of external compensation components and ceramic input and output capacitors. The low Rds(on) internal power switch (0.09Ω) maintains high efficiencies >80% and up to 90%. The /Shdn pin and 15uA shutdown current extends battery life. The wide Vin range of the LT1765 allows step-down configurations from 3Vin up to 25Vin. Synchronization of switching frequencies up to 2MHz is possible.

Demonstration Circuit DC436A is a step-down converter using the LT1765. The circuit is designed for 6.5V to 25V input to 5.0V output at up to 2.5A[1] for cable modem, handheld, automotive, and desktop computer applications. This board was designed for wide input voltage range applications where simplicity, small circuit size, and low component count are important as well as up to 2.5A of load current. The use of ceramic capacitors not only demonstrates small size and low cost, but the advantage of current-mode control in step-down applications with a simple compensation network and a feedforward capacitor for more rugged stability and excellent transient response. The components built on the board are optimized a wide input voltage range, but can be reduced in size for input voltages such as 12V if desired. The adjustable feedback resistors also allows for customizable output voltage.

Typical Performance Summary (T_A = 25C)

Step-Down Converter

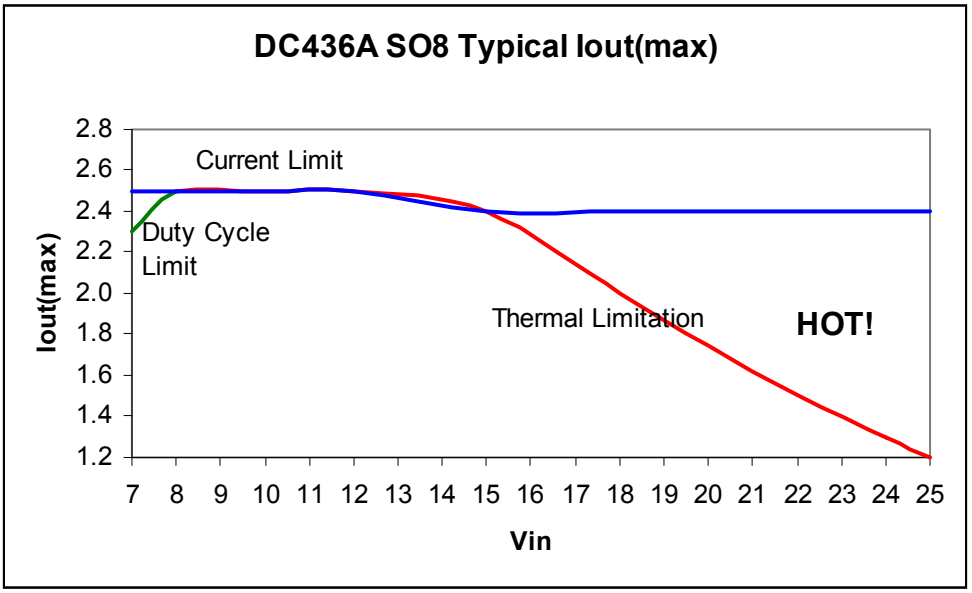
Vin	6.5V to 25V
Vout	5.0V
Iout	2A(max)
Eff.	up to 90% at 1Aout and up to 89% at 2A output
Short Circuit	up to 3A output current with Vout < 250mV

[1] Maximum output current may decrease due to thermal limits of the SO8 package at high input voltages. Frequency compensation is optimized for stability at voltages below 25Vin and stability at high input voltages can be improved by adjusting the frequency compensation components – raising the output current capabilities before thermal shutdown at high input voltages. The new TSSOP 16Pin Exposed-Leadframe package has better thermal resistance than the SO8 package and may be useful in the HOT areas shown on the chart below where the SO8 has reached its thermal limitation. Please see the chart below.

Quick Start Guide

Refer to Figure 1 for proper measurement equipment setup and follow the procedure outlined below:

1. Connect the 6.5 to 25V input power supply to the Vin and Gnd terminals on the board.
2. Connect an ammeter in series with the input supply to measure input current.
3. Connect either power resistors or an electronic load to the Vout and Gnd terminals on the board.
4. Connect an ammeter in series with output load to measure output current.
5. Connect a voltmeter across the Vin and Gnd terminals to measure input voltage.
6. Connect a voltmeter across the Vout and Gnd terminal to measure output voltage.
7. After all connections are made, turn on input power and verify that the output voltage is 5.0V.
8. The synchronization and shutdown functions are optional and their pins can be left floating (disconnected) if their functions are not being used.



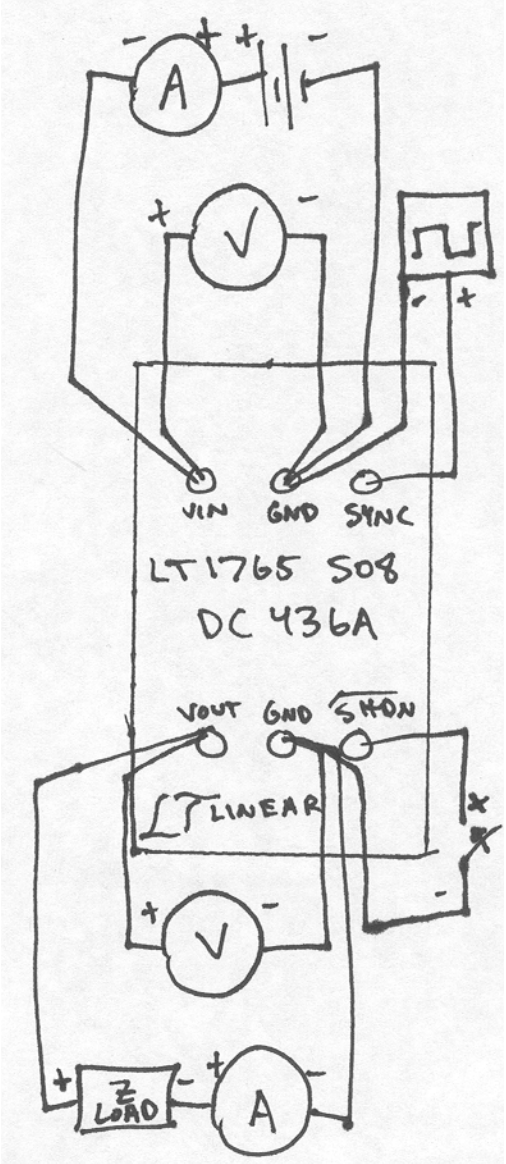


Figure 1… Quick Start connections for DC436A.

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