CS5253B-8

3.0 A LDO 5-Pi 2.5 V Fi ed Li ea Reg la f Rem e Se e App lica i

This new very low dropout linear regulator reduces total power dissipation in the application. To achieve very low dropout, the internal pass transistor is powered separately from the control circuitry. Furthermore, with the control and power inputs tied together, this device can be used in single supply configuration and still offer a better dropout voltage than conventional PNP−NPN based LDO regulators. In this mode the dropout is determined by the minimum control voltage.

The CS5253B−8 is offered in a five−terminal D^2PAK−5 package, which allows for the implementation of a remote−sense pin permitting very accurate regulation of output voltage directly at the load, where it counts, rather than at the regulator. This remote sensing feature virtually eliminates output voltage variations due to load changes and resistive voltage drops. Typical load regulation measured at the sense pin is less than 1.0 mV for an output voltage of 2.5 V with a load step of 10 mA to 3.0 A.

The CS5253B−8 has a very fast transient loop response.

Internal protection circuitry provides for “bust−proof” operation, similar to three−terminal regulators. This circuitry, which includes overcurrent, short circuit, and overtemperature protection will self protect the regulator under all fault conditions.

The CS5253B−8 is ideal for generating a 2.5 V supply to power graphics controllers used on VGA cards. Its remote sense and low value capacitance requirements make this a low cost high performance

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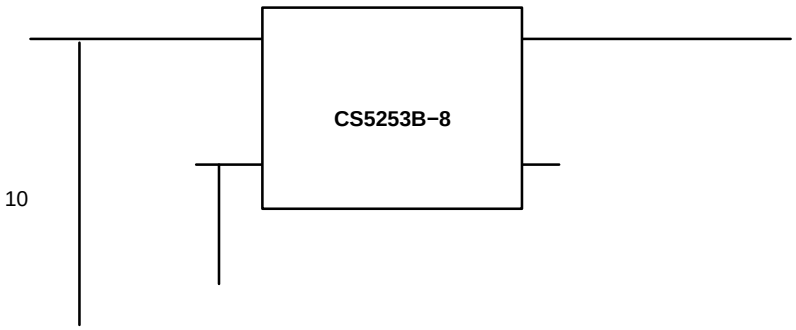

Figure 1. Application Diagram

TYPICAL PERFORMANCE CHARACTERISTICS

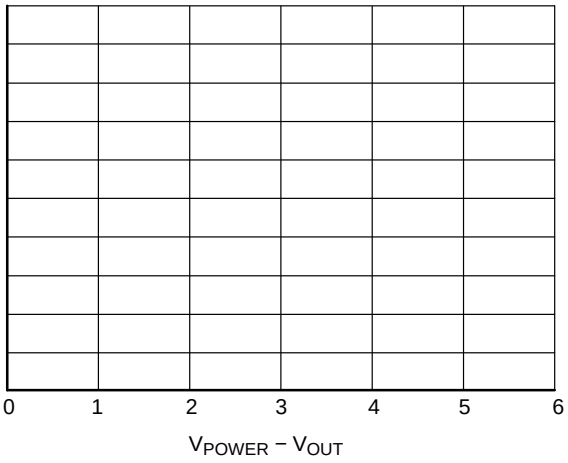

Figure 3. Output Voltage vs Junction Temperature

Figure 4. Output Current vs $V_{POWER} - V_{OUT}$

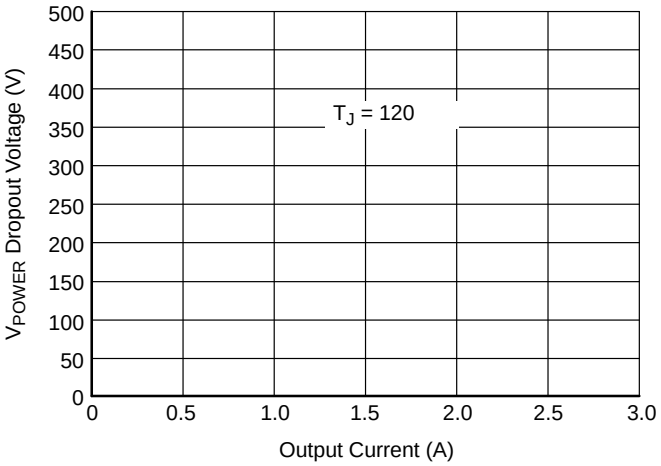

Figure 9. V_{POWER} Dropout Voltage vs Output Current

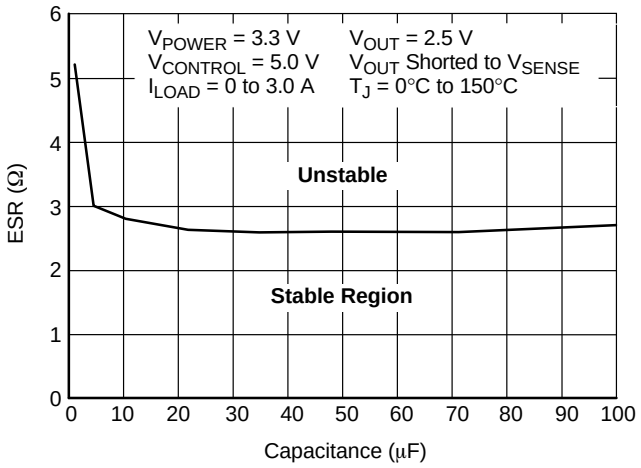

Figure 15. Stability vs ESR

APPLICATIONS NOTES

THEORY OF OPERATION

CS5253Bï

The CS5253B−8 linear regulator is fixed at 2.5 V at currents up to 3.0 A. The regulator is protected against short circuits, and includes a thermal shutdown circuit with hysteresis. The output, which is current limited, consists of a PNP−NPN transistor pair and requires an output capacitor for stability.

V_{POWER} Function

The CS5253B−8 utilizes a two supply approach to maximize efficiency. The collector of the power device is brought out to the V_{POWER} pin to minimize internal power dissipation under high current loads. $V_{CONTROL}$ provides for the control circuitry and the drive for the output NPN transistor. $V_{CONTROL}$ should be at least 1.0 V greater than the output voltage. Special care has been taken to ensure that there are no supply sequencing problems. The output voltage will not turn on until both supplies are operating. If the control voltage comes up first, the output current will be limited to about three milliamperes until the power input voltage comes up. If the power input voltage comes up first, the output will not turn on at all until the control voltage comes up. The output can never come up unregulated.

The CS5253B−8 can also be used as a single supply device with the control and power inputs tied together. In this mode, the dropout will be determined by the minimum control voltage.

Output Voltage Sensing

The CS5253B−8 five terminal linear regulator includes a dedicated V_{SENSE} function. This allows for true Kelvin sensing of the output voltage. This feature can virtually eliminate errors in the output voltage due to load regulation. Regulation will be optimized at the point where the sense pin is tied to the output.

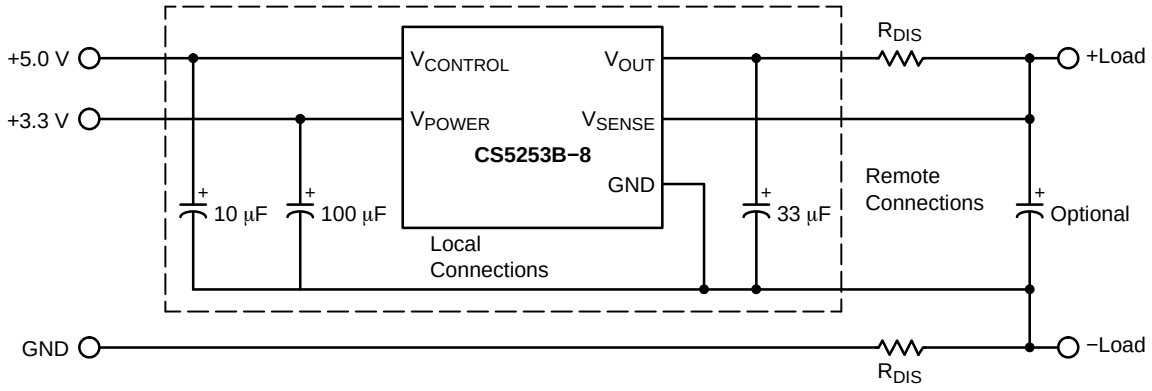

Figure 16. Remote Sense

Calculating Power Dissipation and Heatsink Requirements