LDO Regulator power dissipation testing

Product Point: B1.2.1 Power Regulation

# Aim:

Determine the power dissipation and approximate junction temperature of the LDO regulator.

# Testers and Engineers:

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# Relevant Drawings:

Drawing1.schdoc

Drawing2.pdf

Drawing3.pcbdoc

# Equipment:

* LDO Board in breadboard test rig
* DC Power Supply
* Signal Generator
* 2 Multimeters
* Digital Oscilloscope

Add a diagram or picture here

# Procedure:

1. Connect channel 1 to measure output voltage of the LDO, channel 2 to measure input voltage. Set the oscilloscope Measure capability to measure average voltage on both channels. Connect the multimeters to measure input and output current.
2. The power dissipated in the chip is equal to the total power delivered, less the power transferred to the load. This power will vary with the input voltage (output voltage is constant when the device regulates)
3. Total power delivered is a product of the input voltage and the input current. Power delivered to the load is equal to the output voltage time the output current.

# Results:

For test condition ()

For higher supply currents, one can expect the following values for junction temperature:

10 mA:

100 mA:

# Analysis:

The devices using the LDO regulators are the following: the telemetry system, the CSC, the Beaglebone, the GMSK and AFSK modems, the switching circuit and the beacon. Neither of these devices uses more than 10 mA at any given time. Also, the input voltage to the LDOs will not exceed 6V because of the first-stage switching regulator used.   
On a final note, although the results above are from testing a 5V regulator, the method of analysis applies to the 3.3V regulators as well.

# Conclusion:

Although the expected input voltage is well below the maximum rated value of 10V, we have determined the power dissipation and junction temperature for a wide range of input and current values. From the analysis above, it can be seen that there will be no appreciable rise in junction temperature for the projected range of operating values. The thermal analysis assumes, however, that the ambient temperature remains constant. In a confined space of a BLUESat tray, this might not be so.