Setting the HTC Current Limit with Greater Precision

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INTRODUCTION

The HTC Series Temperature Controllers are versatile chassis mount controllers designed for OEM and benchtop applications. To protect the load from over-current situations, the HTC temperature controllers implement a current limit circuit. The current limit is set using an external 1% resistor, and the method given in the datasheet for calculating the resistor value results in a limit tolerance of ±5%.

For most applications this current limit accuracy is sufficient, but in some cases users may require a more accurate limit setting. This technical note describes a method for setting the current limit with greater accuracy using a multiturn trimpot.

The R_{LIMIT} value used for tighter tolerance limit control may be substantially different than the values calculated using the equations in the datasheet. The figures presented in this Technical Note illustrate the possible resistance ranges.

PROCEDURE

The current limit on the HTC1500 and HTC3000 controllers is set with an external 1% metal-film resistor. The equations and tables to calculate the resistor value are found in the datasheet. If ±5% tolerance is not a suitable current limit tolerance for your application, use this procedure to set the limit more tightly.

1. Connect the HTC as indicated in the datasheet, but with a multiturn trimpot connected across pins 1 and 2 to adjust the current limit. Reference the table below to determine the trimpot value to use.

   Measure the exact resistance of a resistor test load, and connect it to the HTC output. Make sure that the voltage drop across the test load won't exceed the compliance voltage of the controller. The test load identified in the datasheet is a 0.1 Ω, 10 W resistor.

   Adjust the trimpot to the minimum resistance value.

TRIMPOT VALUES FOR FINE TUNING THE CURRENT LIMIT

HTC1500		HTC3000	
Limit Range	**Trimpot**	**Limit Range**	**Trimpot**
0 - 0.5 A	4.7 kΩ	0 - 1 A	4.7 kΩ
0.5 - 1 A	15 kΩ	1 - 2 A	15 kΩ
1 - 1.5 A	470 kΩ	2 - 3 A	470 kΩ

2. Connect a voltmeter across the test load. At high current there will be a voltage drop across the output wires, so it is important to connect the voltmeter leads as close to the test load resistor as possible.

3. Calculate the load voltage drop value that represents the desired current limit: multiply the current limit in amps by load resistor value in ohms (V = I * R).

PROCEDURE, continued...

4. Switch on the HTC and enable the output current.

   Adjust the temperature setpoint to the full maximum in order to force the controller to output the maximum limited current. Adjust the current limit trimpot until the value on the voltmeter matches the voltage calculated for the current limit.

5. Set the temperature setpoint to the proper value for your application; refer to the datasheet. This step is important so that the HTC does not drive to an inappropriate temperature when the actual thermal load is connected later. Switch off the power supply.

6. Because internal circuit component tolerances vary from unit to unit, the final R_{LIMIT} value may be different than the values given in the tables in the datasheet. Figures 1 and 2 illustrate the resistance ranges that may be encountered when tightly setting the current limit.

7. If a high precision current limit is required, use this procedure on each HTC unit to set the current limit resistor value. The potentiometer can be replaced by a precision resistor with a matching value once the R_{LIMIT} value is determined.

8. An alternate method is to place an ammeter in series with the test load resistor and measure the current directly while adjusting the trimpot.

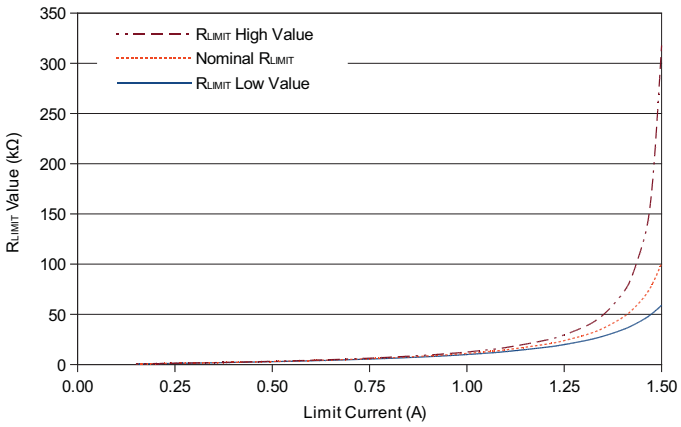

Figure 1. Total R_{LIMIT} Value Range for HTC1500

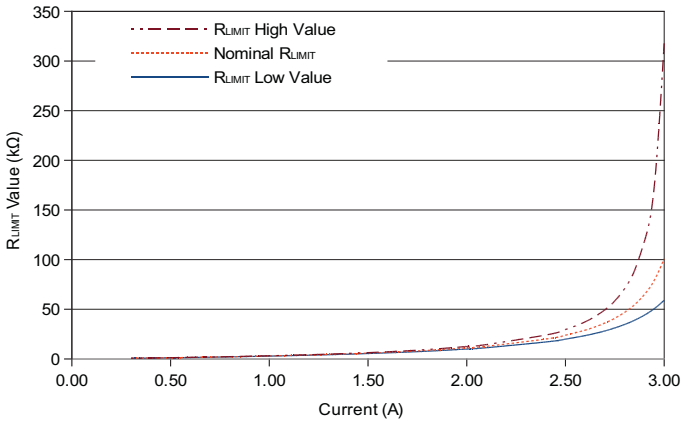

Figure 3. Total R_{LIMIT} Value Range for HTC3000

REVISION HISTORY

REV	DATE	NOTES
A	7-Feb-12	Initial Release

KEYWORDS

HTC1500, HTC3000, R_{LIMIT}, setpoint precision, current limit, tighter tolerance limit control, high precision current limit