



20 Amp Output Current Using Two PLD10K-CH or PLD12.5K-CH Ultra-Stable Laser Diode Drivers

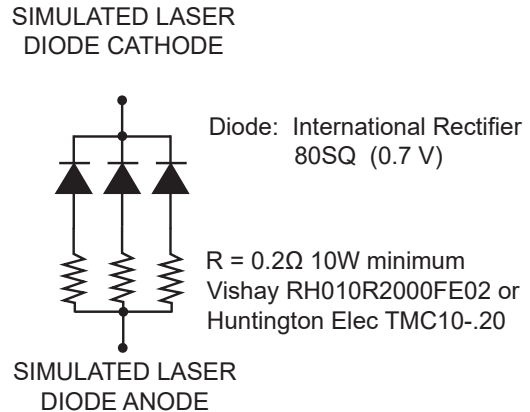
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INTRODUCTION

The PLD10K-CH drives up to 10 A of very stable current optimized to safely power a laser diode. This compact driver can be paired with another to drive up to 20 A. This Application Note describes how to do this in Constant Current mode with both laser diode and control electronics operated at 5 V. No parts internal to the PLD10K-CH need to be modified.

For higher compliance voltage operation or operation in Constant Power mode, please contact the factory.

Figure 1. Set-up Load (2 V Drop)



1. SET-UP TEST LOAD

For high current operation, we recommend verifying the setup with a test load before operating with a laser diode. Figure 1 shows a load suitable for 20 A simulation.

Note that we split the resistors and diodes into three parallel paths. The power rating of a single resistor would be very large. At 20 A, a single 0.2 Ω resistor would require at least an 80 W rating.

Power Rating = $I^2 * R$ where I = max current and R = resistance

By splitting the paths, the maximum current through any leg is 20 / 3 or 6.7 A. The diode is rated for 8 A. Keep the temperature of the load down by either heatsinking it or having sufficient airflow across it.

Substitute this load for the laser diode until you are confident that the setup is correct and safe.

2. PLD HEAT MANAGEMENT

With this load, if each PLD drives 10 A, the internal power dissipation of each unit will be 30 W. With one Wavelength MULTI-HTSK per PLD, and at least 28 cfm of airflow across each heatsink, the temperature rise of the internal components would be 35°C.⁽¹⁾ Derating of the output current starts at 55°C, so full current and safe operation is possible with the MULTI-HTSK, if the ambient temperature is 20°C or less. If these conditions are not met, a larger heatsink with airflow will be required.

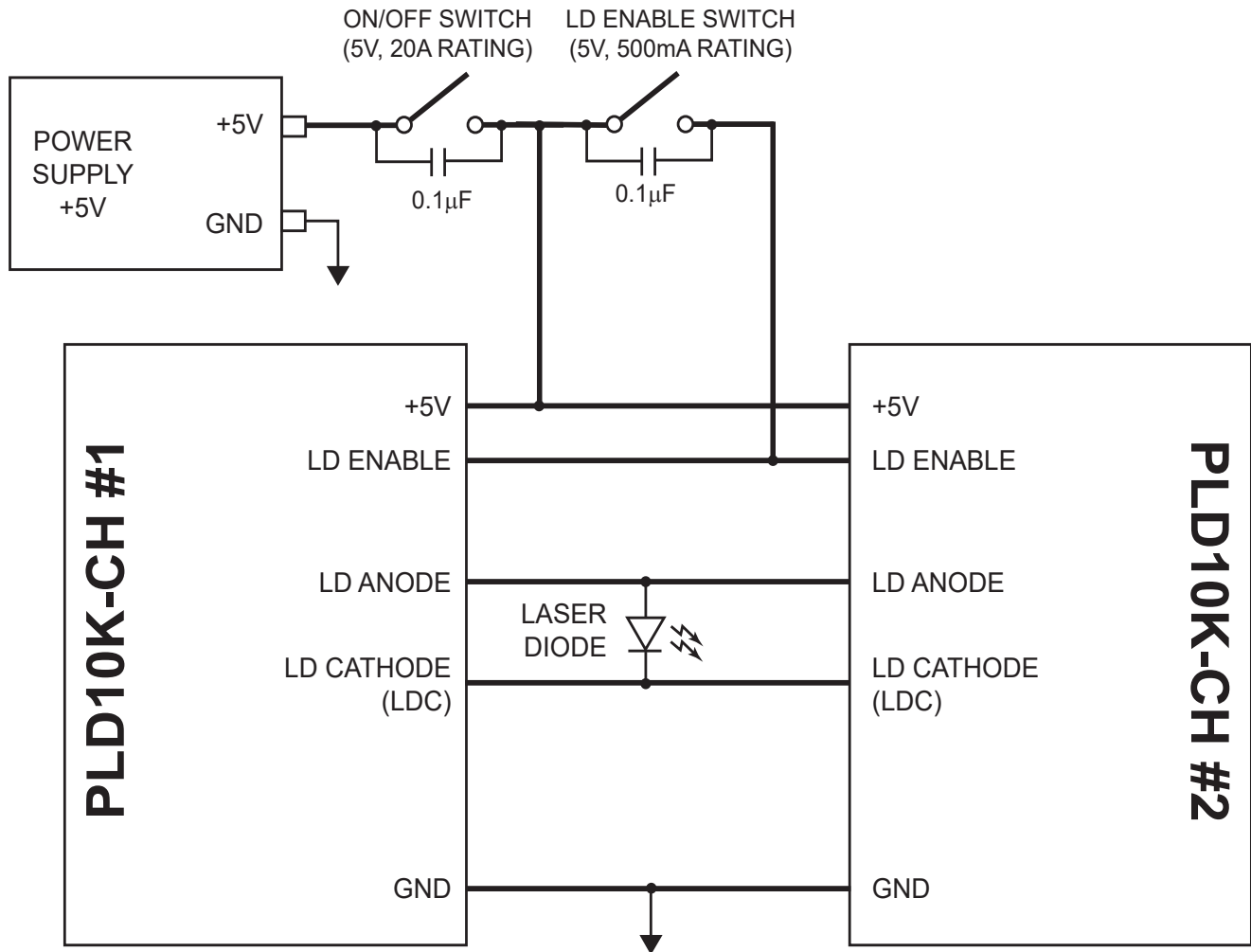
The MULTI-HTSK can be purchased by emailing: sales@teamwavelength.com.

The Safe Operating Area of the linked units (where internal power dissipation is below maximum) can be calculated using the SOA calculator, available online at:

<http://www.teamwavelength.com/support/calculator/soa/soald.php>

⁽¹⁾ The fan used to determine temperature rise was Mechatronics F8025M-G.

3. SCHEMATIC FOR PARALLEL PLD10K-CHS



NOTES ON OPERATION — PLD10K-CH

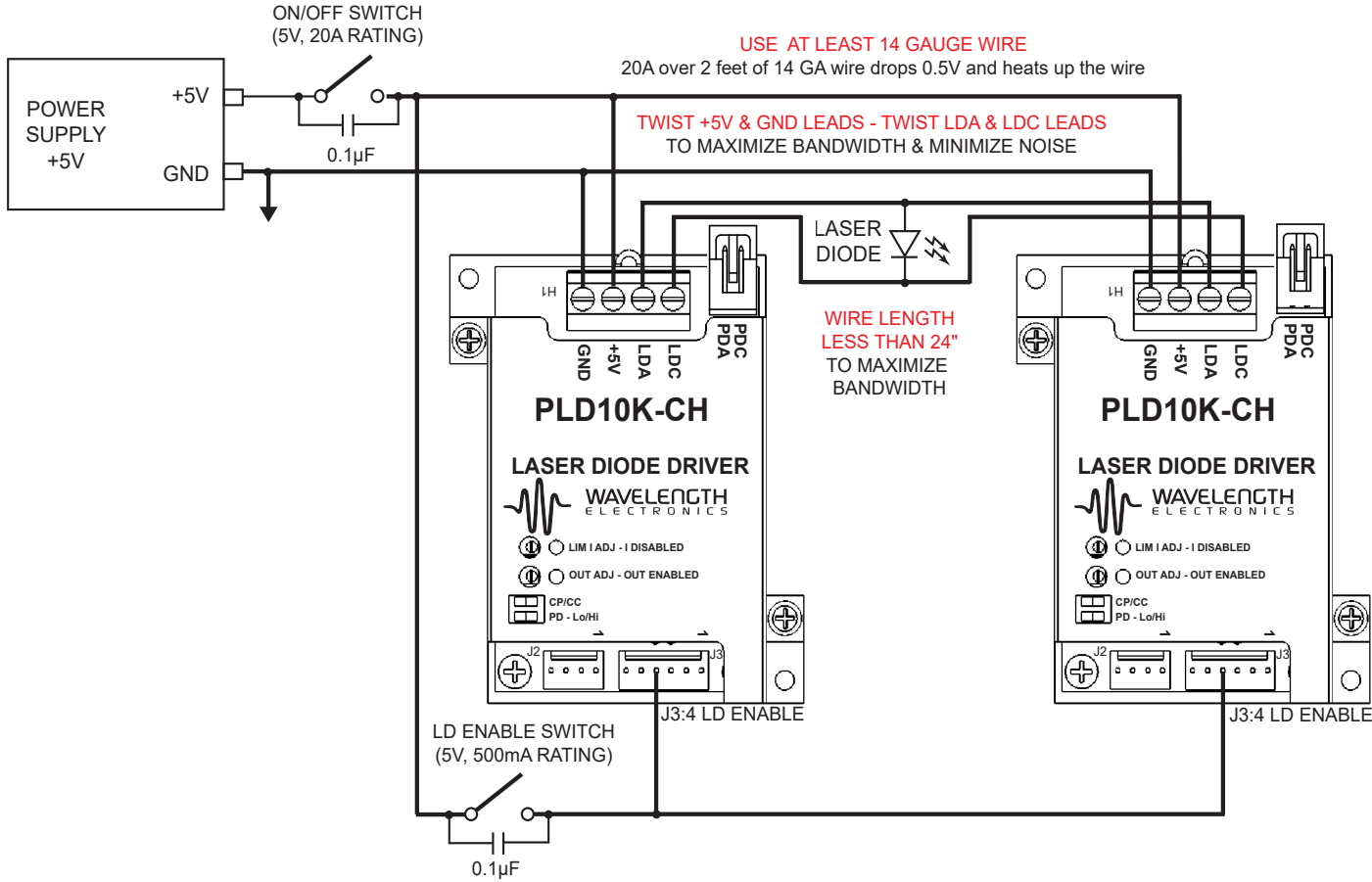
1. We recommend balancing the current through the two PLDs, but it is not necessary. The two PLD10K-CH's do not need to drive the same level of current. For a 15 A laser diode, you could run one at 10 A and the other at 5 A. Note that the power they dissipate will be uneven and calculating the internal power dissipation independently for both is critical. For example, if you need 14 A to your laser diode, you could use a PLD10K-CH and a PLD5K-CH. The PLD10K-CH could be set at 9 A of operation, while the PLD5K-CH could be set at a maximum of 5 A. Or you could use two PLD10K-CH's at 7 A each. In the second scenario, the temperature of the internal components of the PLD10Ks (and therefore your enclosure) will be lower and the design will be more robust for long term operation.

Online SOA Calculators are available at: <http://www.teamwavelength.com/support/calculator/soa/soald.php>

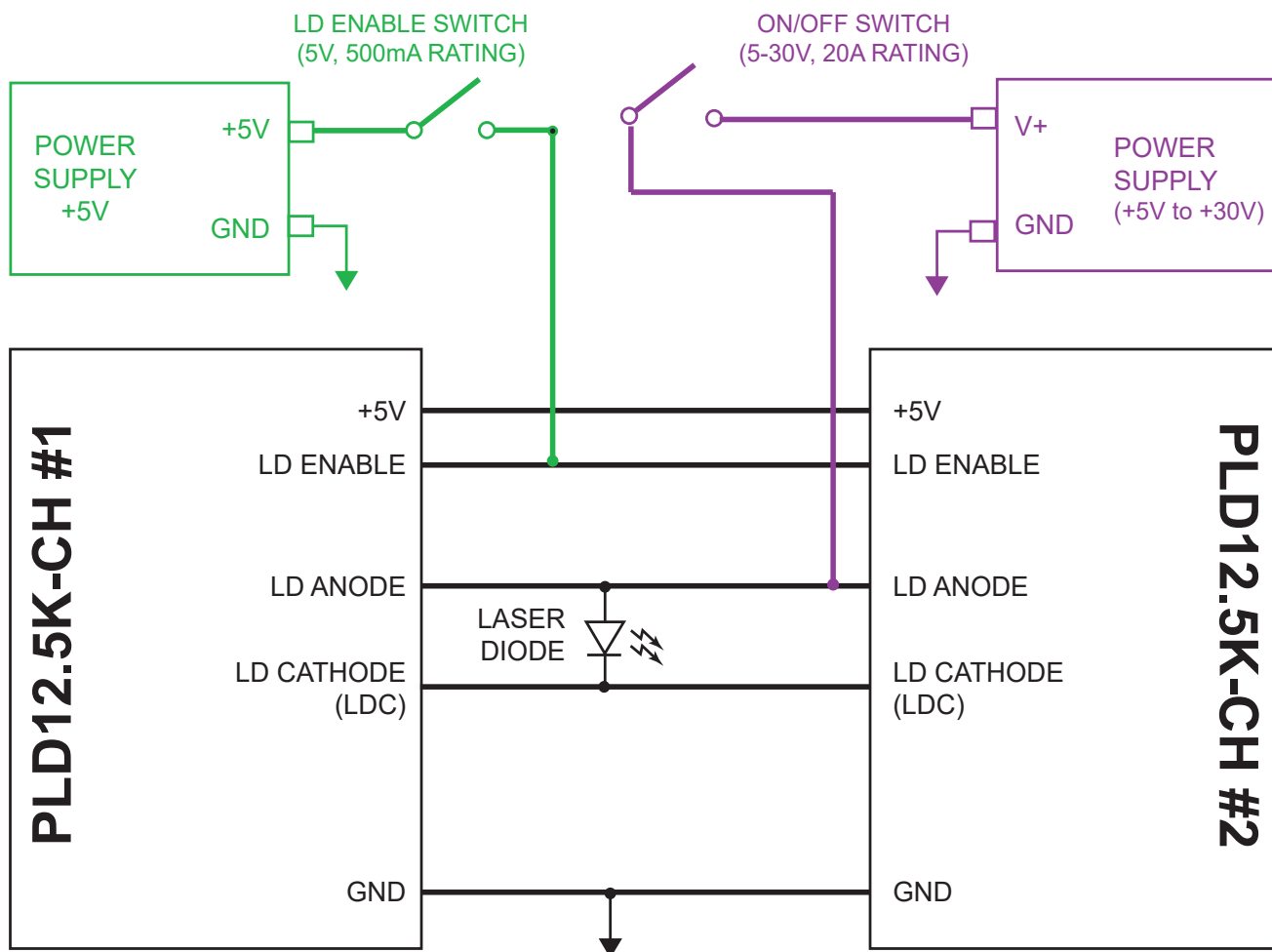
2. We recommend operating with a test load until you are comfortable with the high current setup.
3. After wiring for parallel operation, follow the operating instructions in the PLD10K-CH datasheet.
4. The two LD ENABLE inputs must be on the same line.
5. The power supply voltage must be the same for both PLDs.

4. WIRING SUGGESTIONS FOR 20 A — PLD10K-CH

- 1. If using 5V, use a minimum of 14 gauge wire. Higher voltage requires a lower gauge (i.e. 12 awg or larger).
- 2. Minimize the wire length to the laser diode. 20 A over a 14 gauge wire drops approximately 0.25 V per foot.
- 3. Twist the high current leads - LDA & LDC and +5V & GND. This minimizes noise and maximizes bandwidth.
- 4. Short the Analog Inputs to Ground if not used. If the input is left unconnected, its voltage will “float” and sum with the Output Adjust trimpot, causing the current setpoint to rise above the trimpot setting.



5. SCHEMATIC FOR PARALLEL PLD12.5K-CHS



NOTES ON OPERATION — PLD12.5K-CH

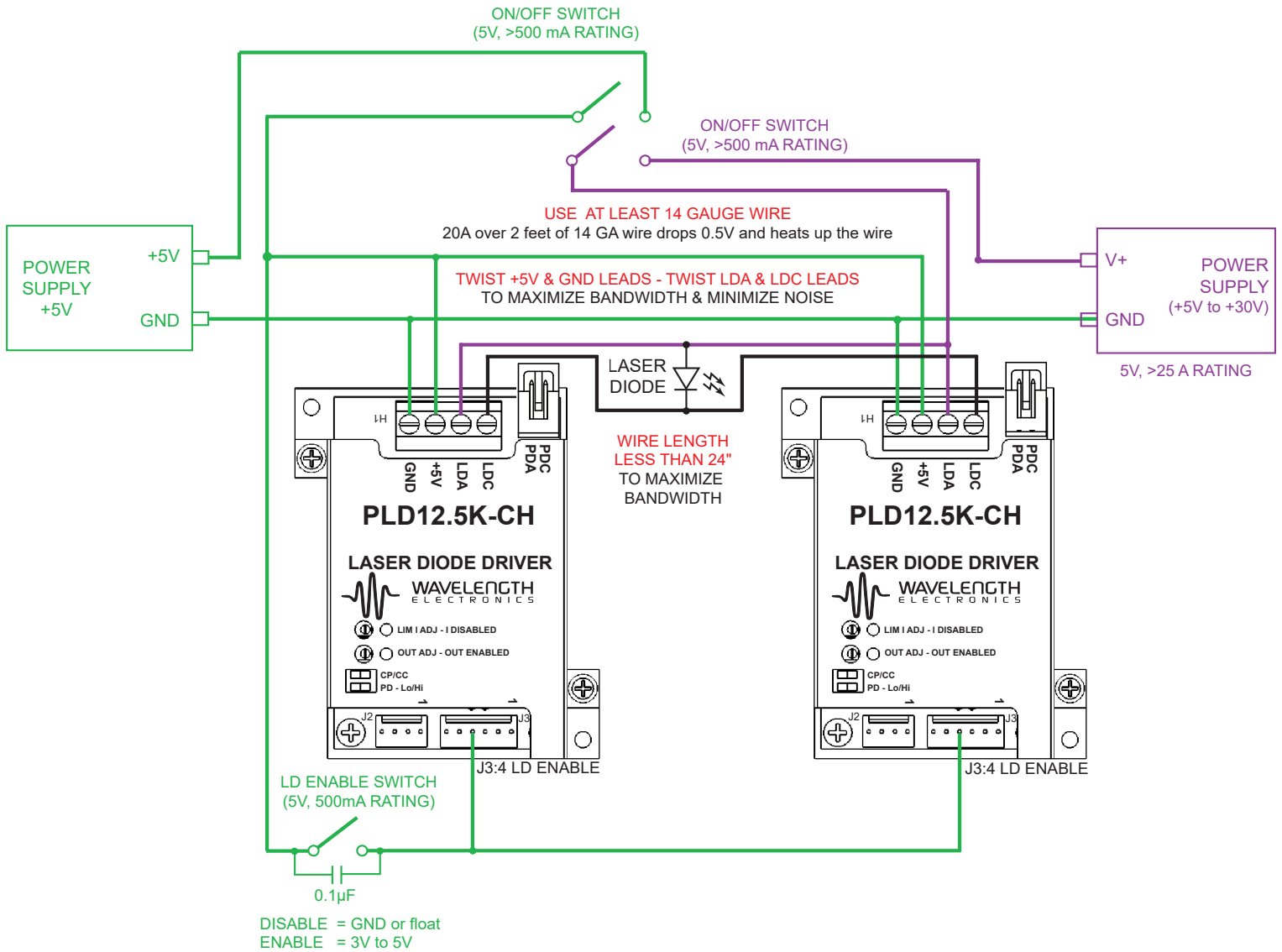
1. When using PLD12.5K-CHs, note that the jumper must be cut. Refer to the datasheet for instructions.
2. We recommend balancing the current through the two PLDs, but it is not necessary. The two PLD10K-CH's do not need to drive the same level of current. For a 20 A laser diode, you could run one at 12.5 A and the other at 7.5 A. Note that the power they dissipate will be uneven and calculating the internal power dissipation independently for both is critical. For example, if you need 17 A to your laser diode, you could use a PLD12.5K-CH and a PLD5K-CH. The PLD12.5K-CH could be set at 12 A of operation, while the PLD5K-CH could be set at a maximum of 5 A. Or you could use two PLD12.5K-CH's at 8.5 A each. In the second scenario, the temperature of the internal components of the PLD12.5Ks (and therefore your enclosure) will be lower and the design will be more robust for long term operation.

Online SOA Calculators are available at: <http://www.teamwavelength.com/support/calculator/soa/soald.php>

3. Two power supplies are required. One for +5V input and one to drive the laser diode anode (LDA).
4. We recommend operating with a test load until you are comfortable with the high current setup.
5. After wiring for parallel operation, follow the operating instructions in the PLD10K-CH datasheet.
6. The two LD ENABLE inputs must be on the same line.
7. The power supply voltage must be the same for both PLDs.

6. WIRING SUGGESTIONS FOR 20 A — PLD12.5K-CH

1. When using the PLD12.5K-CH, note that the jumpers must be cut. Refer to the datasheet for instructions.
2. The PLD12.5K-CH requires two power supplies. One for the +5V input and one to drive the laser diode anode (LDA).
3. If using 5V, use a minimum of 14 gauge wire. Higher voltage requires a lower gauge (i.e. 12 awg or larger).
4. Minimize the wire length to the laser diode. 20 A over a 14 gauge wire drops approximately 0.25 V per foot.
5. Twist the high current leads - LDA & LDC and +5V & GND. This minimizes noise and maximizes bandwidth.
6. Short the Analog Inputs to Ground if not used. If the input is left unconnected, its voltage will "float" and sum with the Output Adjust trimpot, causing the current setpoint to rise above the trimpot setting.



KEYWORDS

Laser Diode Driver, laser driver, current source

APPLICABLE PLD10K-CH REVISIONS

This Application Note is appropriate for Rev B of the PLD10K-CH. Revision is indicated in the third digit of the lot number of the unit. Example: CHB081001 = Rev B



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