



CRaTER Pre-Environmental Review  
(I-PER)

Engineering Requirements/Design Updates  
Bob Goeke

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*Cosmic Ray Telescope for the Effects of Radiation*



## Resource Status

	<b>Mass</b>	<b>Power</b>	<b>Data Rate</b>
<b>PDR</b>	5.2 Kg	5.1 w	515 bps / 89.0 Kbps
<b>CDR</b>	5.46 Kg	8.07 w	616 bps / 89.1 Kbps
<b>CBE</b>	5.53 Kg	6.66 w	616 bps / 89.1 Kbps
<b>Allocation</b>	6.36 Kg	9.00 w	89.1 Kbps
<b>Margin</b>	15%	35%	n/a



## Mechanical Design Changes since CDR

- Top Cover was redesigned to increase the stiffness of the cover and the E-Box/CRaTER Assembly.
- The material for the Digital to Analog cable clamp was changed from Teflon to Aluminum.
- Added a floating nut plate on the telescope to provide mounting location for the Thermal Blanket hardware.
- Redesigned strain relief for detector mounts



## Electrical Design Changes since CDR

- Reduced analog gain of thin detectors by 3X per science requirement change.
- Changed internal calibration low rate clock period from 2Hz to 8Hz
- Added 32-sample averaging to housekeeping data
- Rebuffered PWM DACs to reduce noise coupling from the digital 5VDC supply
- Added relay on output of DDC 1553 module

## Data Design Changes since CDR

- None



## Thermal Design Changes since CDR

- No changes to design
- Thermal model was found deficient in June TIM
  - Modeling software was not calculating conduction of e-box walls correctly.
  - Thermal blanket implementation doubled the effective radiating area of the (single layer) telescope aperture.
  - Net result is an increase in temperature gradient from the telescope to the mounting interface.



## Electronic Components

- Thermal-Vacuum test results on Flight Unit internal components
  - Max junction numbers assume +40C instrument reference temperature (hot qual)

<b>Component</b>	<b>Dissipation</b>	<b>Theta JC</b>	<b>Case Rise</b>	<b>Max. Junction</b>	<b>Max. Derate</b>
<b>DDC 1553</b>	1100 mw	7.6 C/W	16 C	64 C	110 C
<b>Actel FPGA</b>	250 mw	2.0 C/W	17 C	58 C	85 C
<b>BAE SRAM</b>	100 mw	11 C/W	10 C	51 C	85 C
<b>IR converter</b>	1100 mw	n/a	2 C	42 C (case)	85 C (case)