

FLI ML8300 Standard Grade
Camera Preliminary
Characterization Report:
Photon/Dark Transfer Curve
Analysis

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13 September 2009

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Scope of Work

- A standard grade FLI Proline ML8300 was characterized to quantify its performance in several areas
 - Specific parameters measured included:
 - Read noise
 - Full well capacity
 - PhotoResponse NonUniformity (Pn or PRNU)
 - DarkSignal NonUniformity (Dn or DSNU)
 - Camera Gain
 - Cooling
- Photon Transfer* methods were used for the analysis

*click:

http://www.narrowbandimaging.com/ptc_method_wsp2009_page.htm

**click:

http://www.narrowbandimaging.com/rbi_paper_crisp_page.htm

Summary of Measured Results

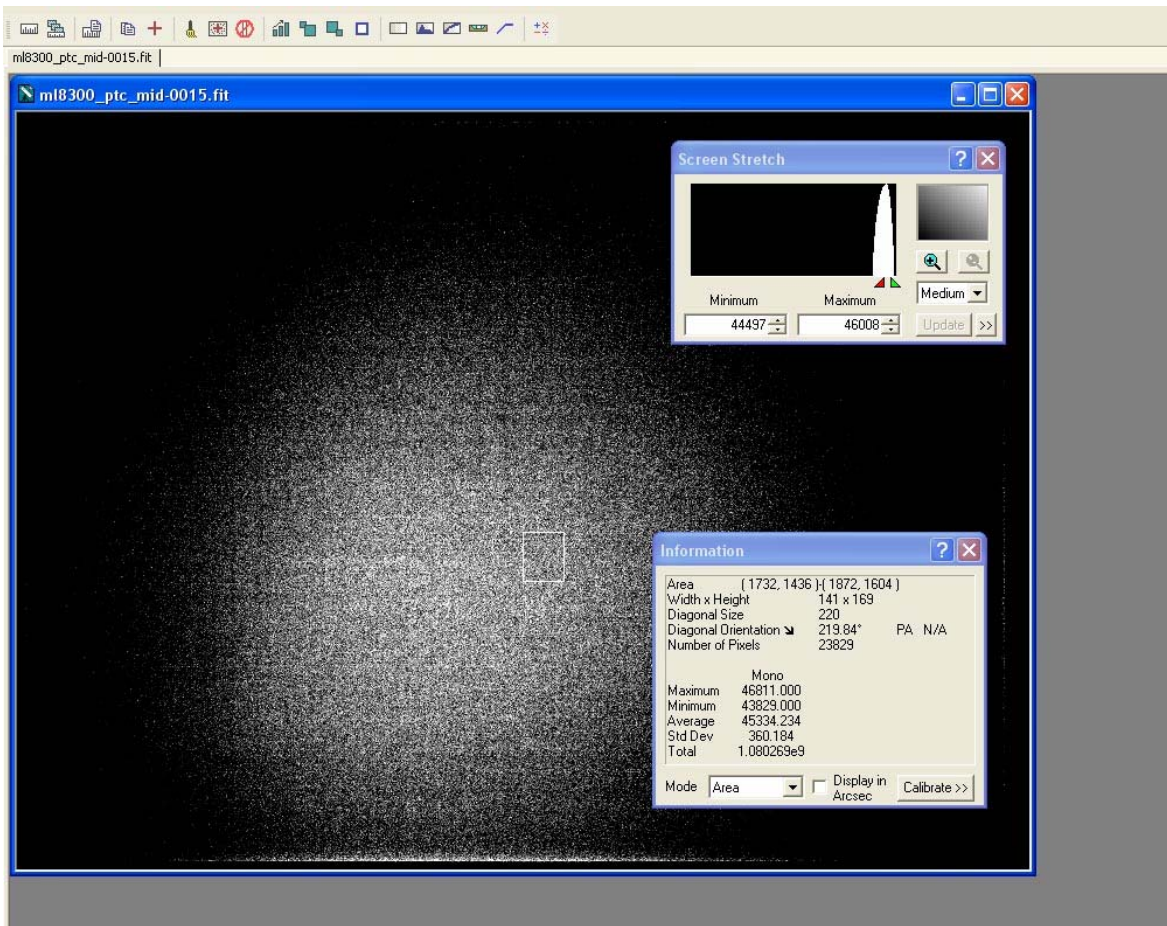
Parameter	Measured value
Read Noise @ 8 MHz	7.64 (e-)
Full Well Onset	26,176 (e-)
PRNU	0.37%
DSNU	90.1%
Camera Gain	0.4 e-/DN
Cooling	65C delta from ambient

Details of Characterization

Photon Transfer Procedure

- For non-RBI related tests, standard photon transfer measurements of a flat field were performed
 - Using ambient lighting, pairs of identical exposures were made beginning with minimum exposures and ending with full well: all light-on tests were made at -25C
 - All exposures were made using overscan to precisely determine the offset value (bias frames aren't good enough)
 - A specific selection box location containing 10,000 pixels was used for all measurements (light on, dark, RBI)
 - Dark measurements were made at $+15\text{C}$ using pairs of identical darks starting with minimum exposures to a maximum of two hours at $+15\text{C}$. Minimum signal dark tests were made at -15C to reduce amount of charge collected to minimal values
 - Standard Photon transfer data reduction methods were used
 - The read noise value was measured in the overscan region and was used for the Y axis intercept for the PTC/DTC since near zero valued signal counts are difficult to obtain.

Typical Flat Field Frame used for PTC



Selection box is 100 x 100 pixels

X-offset: 1750

Y-offset: 1275

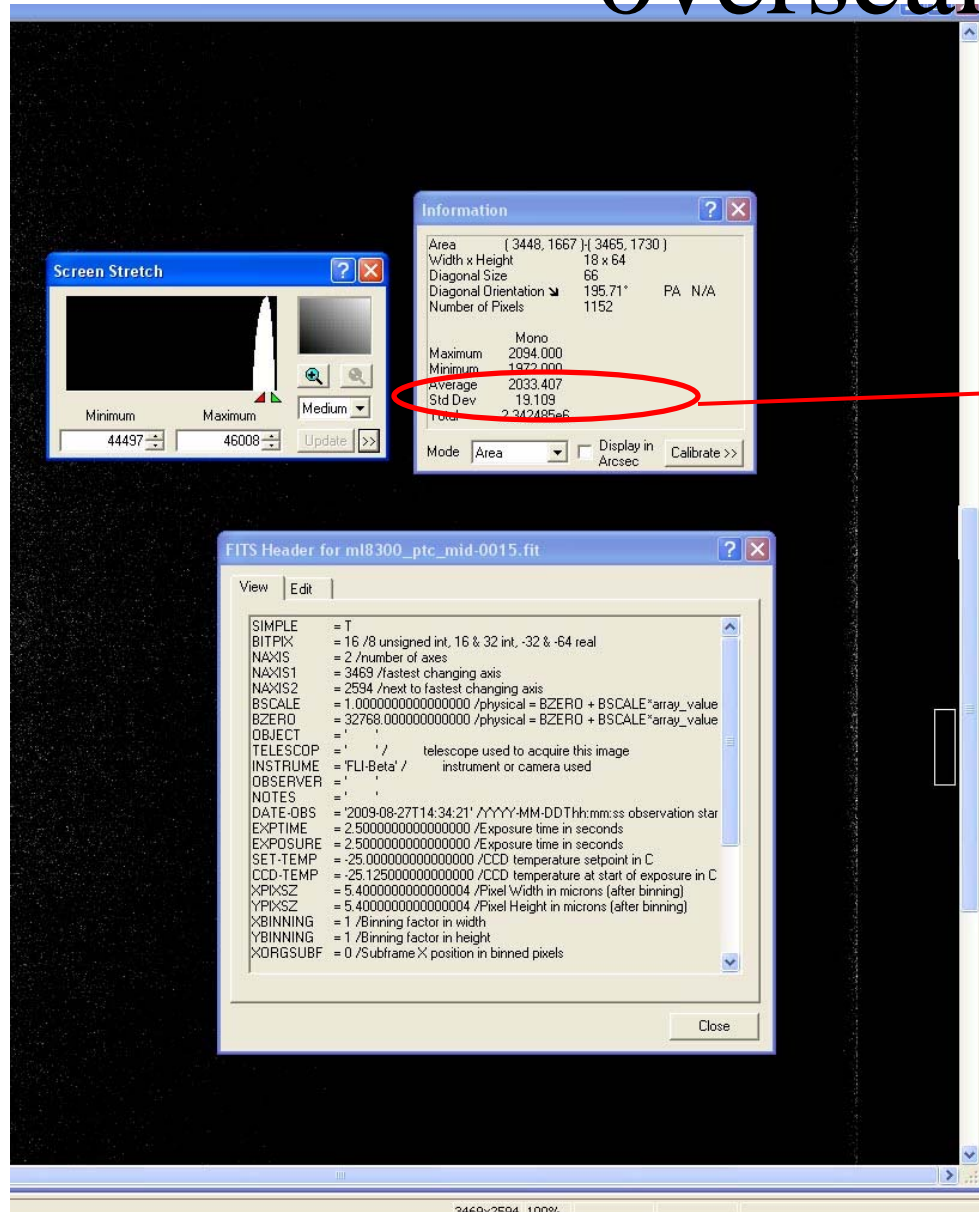
Location selected for nominal pixel behavior: no “junk” pixels, and measurement

convenience while avoiding gradients

Used 2 hour +15C dark to pick location for analysis

- Same identical pixels used for all tests

Read noise determination from overscan region



Overscan region:
Std deviation = 19.109DN

Kadc: 0.4e-/DN

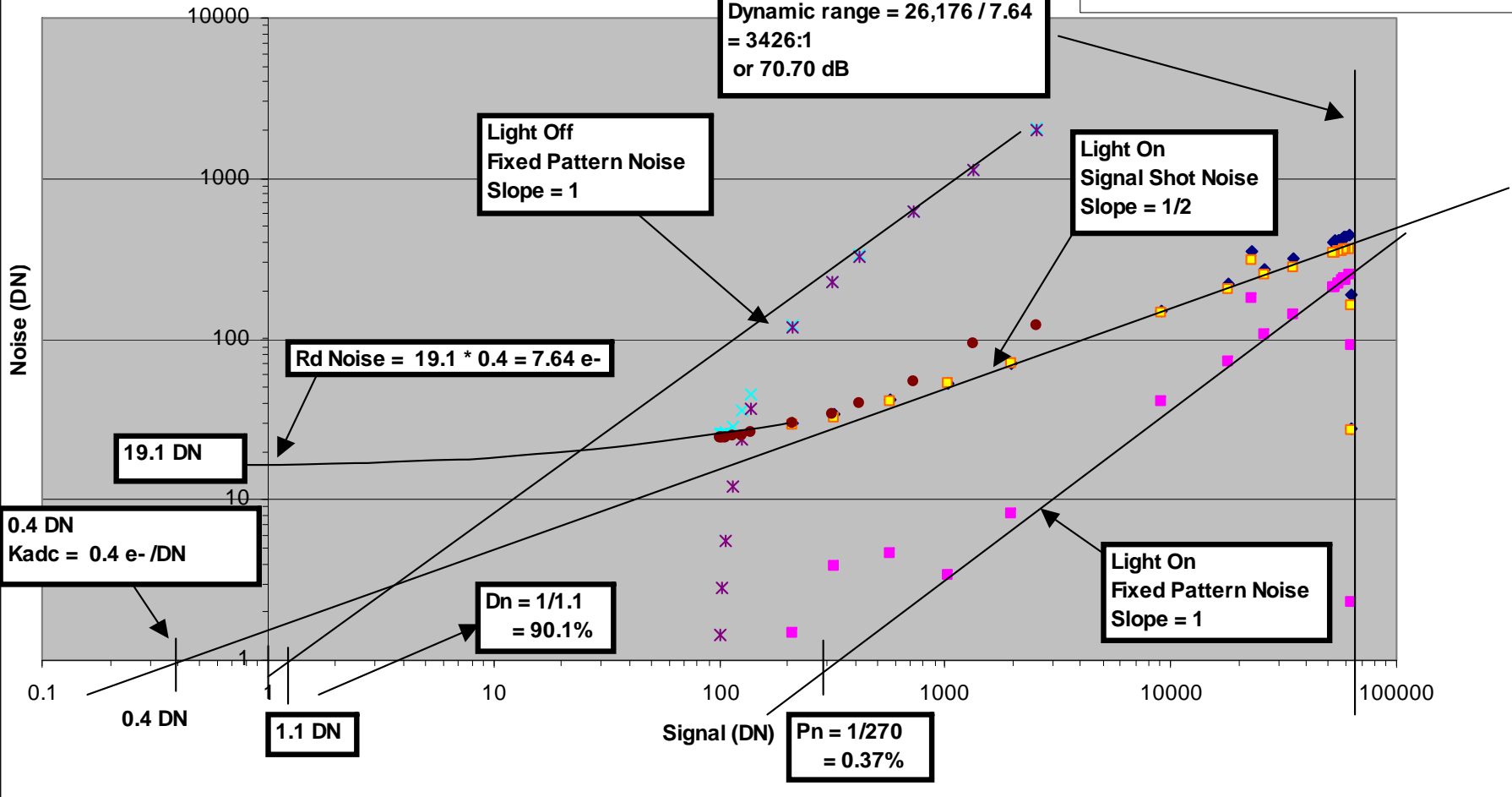
Read Noise: $= 19.109 * 0.4$
 $= 7.64 e-$

Photon Transfer Curves: Light-on and Light-Off
 FLI ML8300 with Standard Grade KAF8300
 8 Megasample/sec readout

100 x 100 pixel selection box
 R.D. Crisp 28 Aug 2009
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- ◆ Light Total Noise
- Light Fixed Pattern Noise
- Light Shot Noise
- × Dark Total Noise
- × Dark Fixed Pattern Noise
- Dark Shot Noise

Full Well = 65,440 DN
 = 26,176 e⁻
 Dynamic range = 26,176 / 7.64
 = 3426:1
 or 70.70 dB



Images



ML8300
12 hours total
exposure time:
AP155EDF f/7
with 100mm
field flattener
FLI Research
Grade
[SII], Halpha
and [OIII] filters

Image Link:

http://www.narrowbandimaging.com/ic1396_ap155_ml8300_s2hao3_page.htm



ML8300
5 hours total
exposure time:
AP155EDF f/7
with 100mm
field flattener
no filter

Image Link:

http://www.narrowbandimaging.com/m33_ap155edf_f7_ml8300_nofilter_page.htm



ML8300
45 minutes
total exposure
time:
AP155EDF f/7
with 100mm
field flattener
FLI Research
Grade Halpha
Filter

Image Link:

http://www.narrowbandimaging.com/ic434_ap155edf_f7_ml8300_fli_ha_page.htm