

LSST CMOS Array Requirements

Priority

High	
Moderate	
Low	

	Allowable Range	Target	Units
Physical:			
Format(1-side)	>= 2048	>= 2048	pixels
Pixel size	8-12	10	microns
Flatness Deviation	<=10	<=5	microns
Outgassing	<10	<5	10 ⁻¹¹
Packaging			
X-axis Metrology	<100	<=25	microns
Y-axis Metrology	<100	<=25	microns
Z-axis Metrology	<10	<=5	microns
Rotational Metrology	<0.035	<0.025	degrees
Parallelism	<20	<10	microns
non-radioactive material		yes	
Agrigate fill factor (over full array)	>90%	>95%	percent
Buttability	4	4	side
Butting gap (3 sides)	<500	<=250	microns
Butting gap (1 side)	<1500	<=500	microns
Temperture			
Storage	-60 - +50		C
Operating	-60 - -30	-50	C
Cycling Range	-55 - +30		C
Total Cycles	>150	>200	

Electrical:			
Full well	>=70000	>=90000	electrons
Non-linearity			
Absolute	<7	<5	%
Stability	<1	<0.5	%
Dark Signal (95th percentile @-50C)	<4	<2	e-/pixels/sec
Cosmetics			
Bright Pixels	1:4000	1:10000	pixels
Dark Pixels	1:4000	1:10000	pixels
Charge Memory (residual image)			
after 1 reset	<0.05	<0.02	percent
after 10 resets	<0.005	<0.002	percent
after 100 resets	<0.005	<0.001	percent
Readout			
Frame Read Time	<3	<2	seconds
Sub-Array		Any	
Output-output Crosstalk	<0.05	<0.01	percent
Output-output Crosstalk stability	<0.02	<0.01	percent
Pixel-to-pixel Crosstalk	<5	<3	percent
Incomplete settling	t _{RC} <t _{sample} /5	t _{RC} <t _{sample} /10	seconds
Random noise	<10	<=6	electrons
Fixed pattern additive offset	<50	<30	electrons
Fixed pattern jittter	<3	<=2	electrons
Max. Pixel rate per output		0.5	Mhz
Conversion Gain	4-20	5	u-volt/electron

Optical:

A-R Coating
DQE

broad-band

400nm	>55	>60	%
600nm	>80	>85	%
800nm	>80	>85	%
900nm	>60	>85	%
1000nm	>25	>45	%
Pixel-to-pixel variations	<5	<2	% rms
Variations across device	<15	<10	%
Device DQE Stability			
1 hour	<2	<1	% p-p
1 month	<4	<2	% p-p
1 year	<10	<5	% p-p
Fringing (within centered 100nm bandpass)			
800nm	<10	<5	% p-p
900nm	<15	<5	% p-p
1000nm	<20	<5	% p-p
Pixel FWHM (charge spreading)	<10	<7.5	microns
Self Optical Emission Blocking			
To Main Array	<1	<0.5	photon/sec/pixel
Normal to main array	<15	<10	photon/sec/pixel