

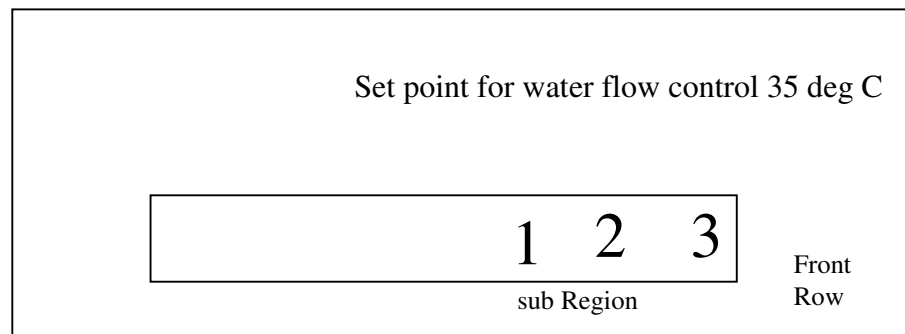
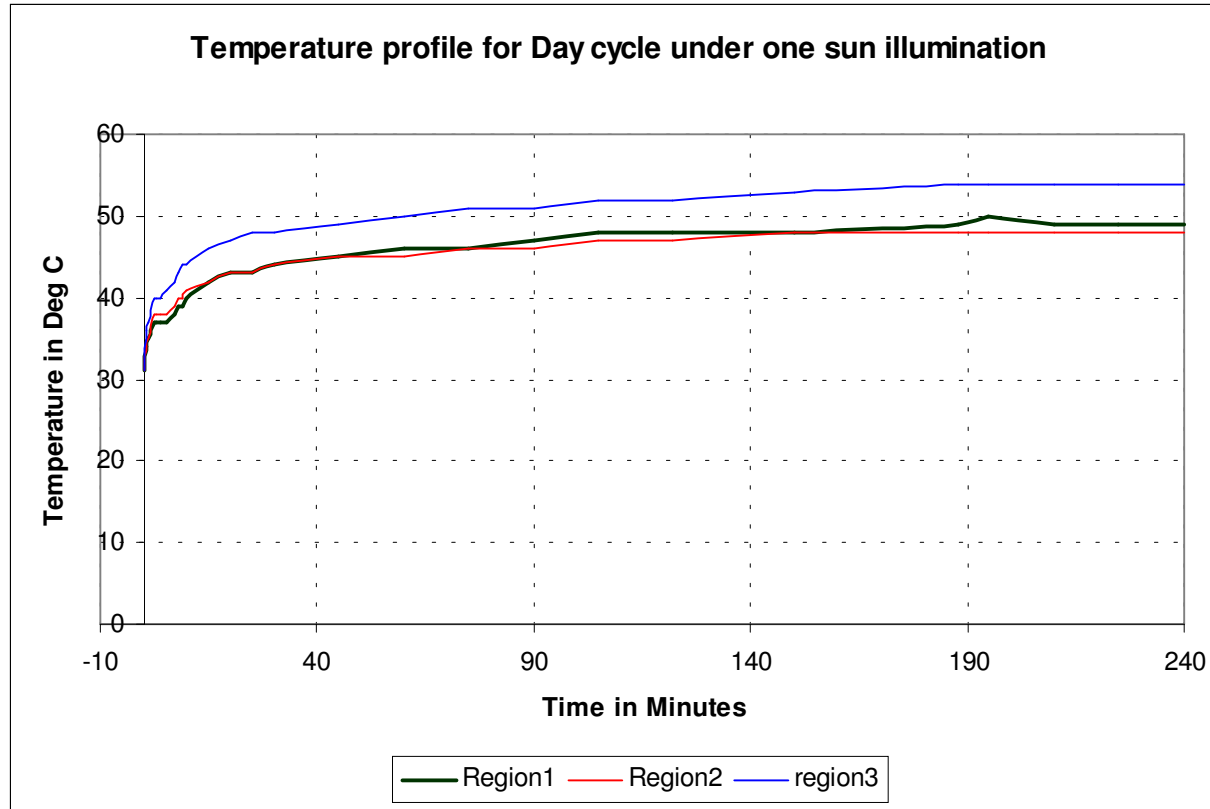
Stability Analysis of CdS/CdTe Solar Cells

Objective:

- To study and analysis of CdS/CdTe Solar cells for their stability performance under light soaking
- Standardize the stability testing procedure
- To investigate degradation mechanisms involved in the cell performance.

Measurement Setup

- λ One Half of Sample substrate is mounted inside the oven and stressed under one sun intensity simulated using Halogen lamps and other half remain unstressed.
- λ Day and Night cycle is done by turning on and off the lights at 4 Hour interval.
- λ The samples are maintained at desired temperature zone using water cooling technique.(Now it is maintained below 45 deg C)
- λ Characterization techniques such as IV,CV, Color IV and CF Measurements are used to analyze the degradation mechanisms involved.
- λ Light and Dark IV Measurements are made frequent intervals, keeping samples stressed inside the oven.
- λ The samples are maintained at UHP N₂ ambient.



Samples now under stress

- Annealing Temperature after CdCl₂ treatment

360,370,380,390 and 400 deg C

- Various CBD CdS Deposition Time

60,70,80 minutes

- CdTe only samples without Back contacts to see the effect of back contacts in degradation process

- Samples with CuCl₂ treatment on CdS.

Note:

So far 800 Light Hours completed.

Samples are tested under Open Circuit and Short Circuit Condition.

Effect of CdCl_2 Annealing Temperature on Stability of CdTe solar cells

Compared for CdCl_2 Annealing Temperature 380 Deg C and 400 deg C

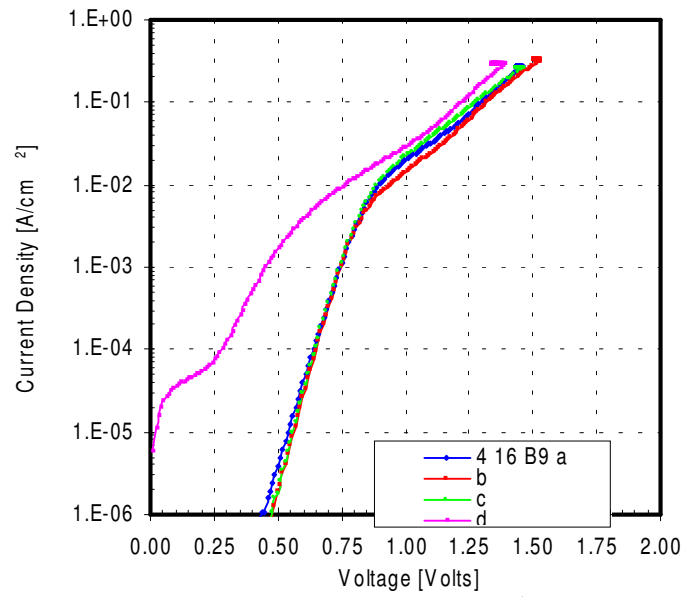
Initial Measurements

Light and Dark JVs

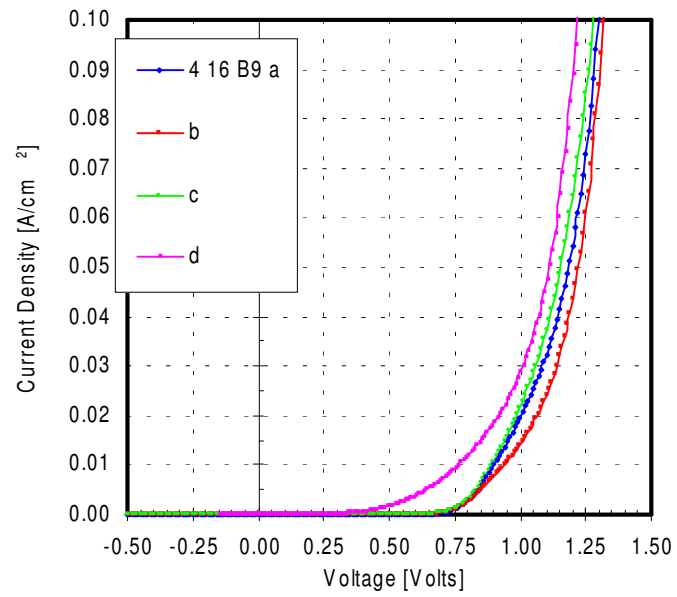
CV and CF Data

Color JV Data

SR

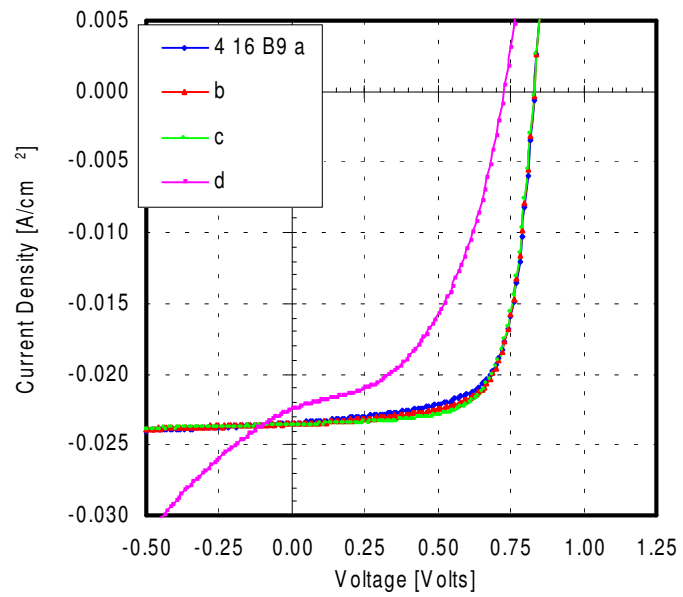


Dark JV

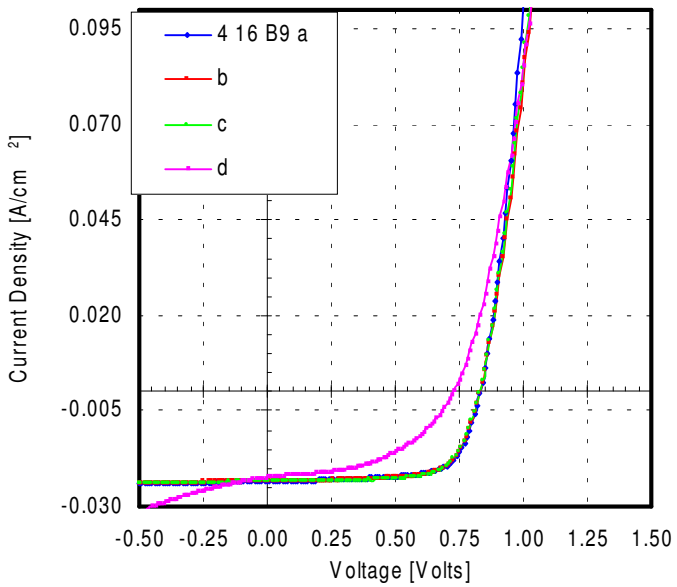


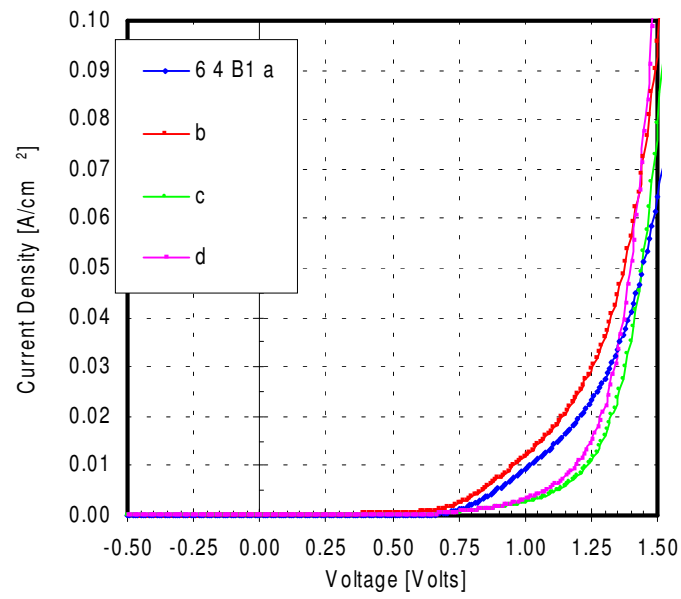
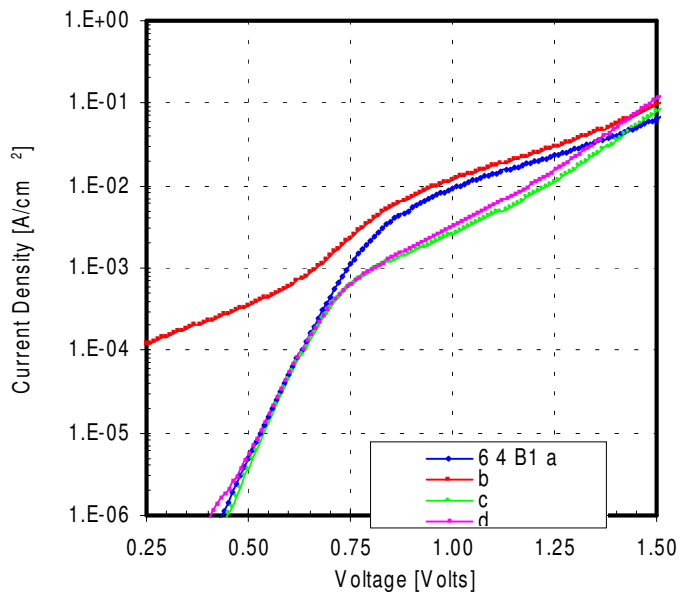
380 Deg C

Initial



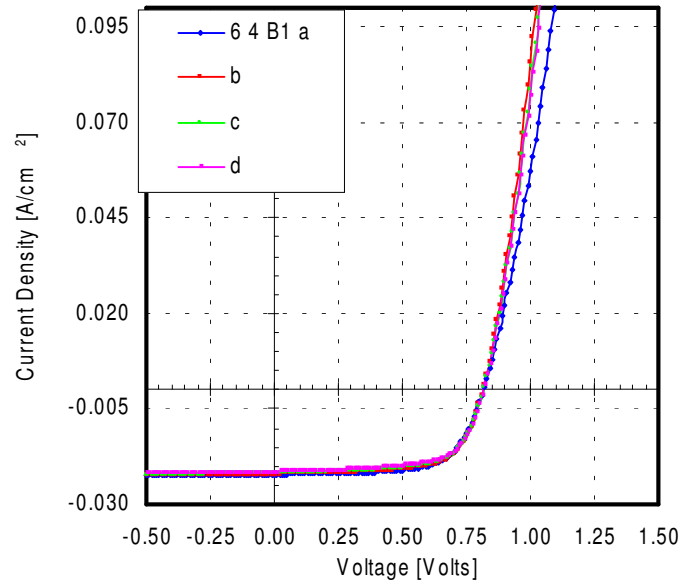
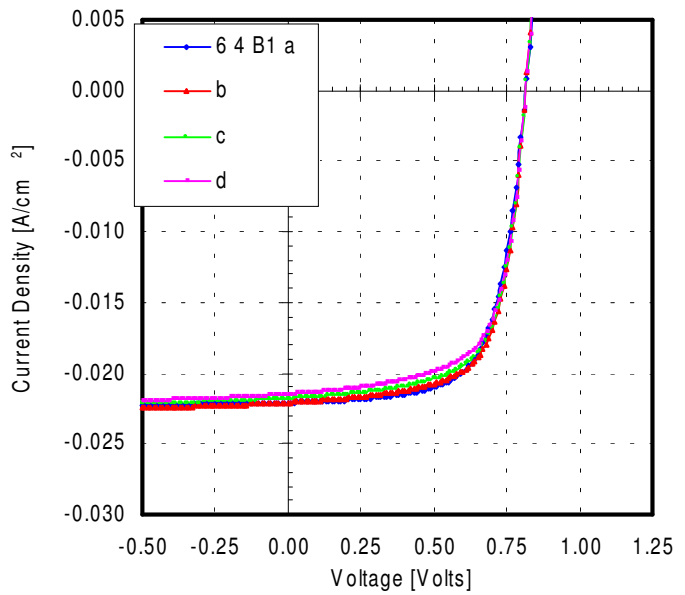
Light JV





Dark JV

400 Deg C



Initial

Light JV

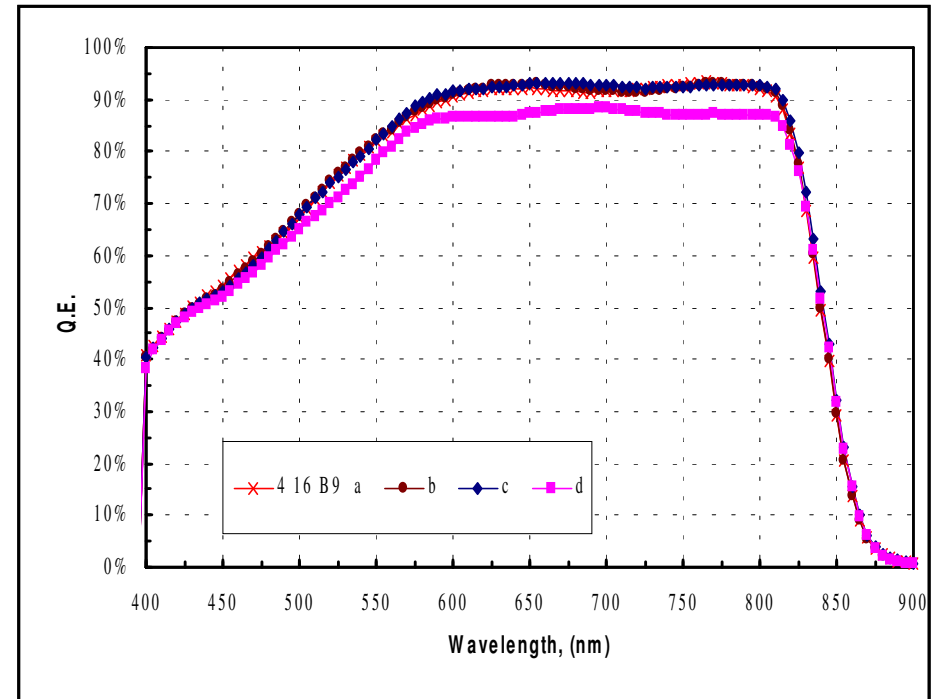
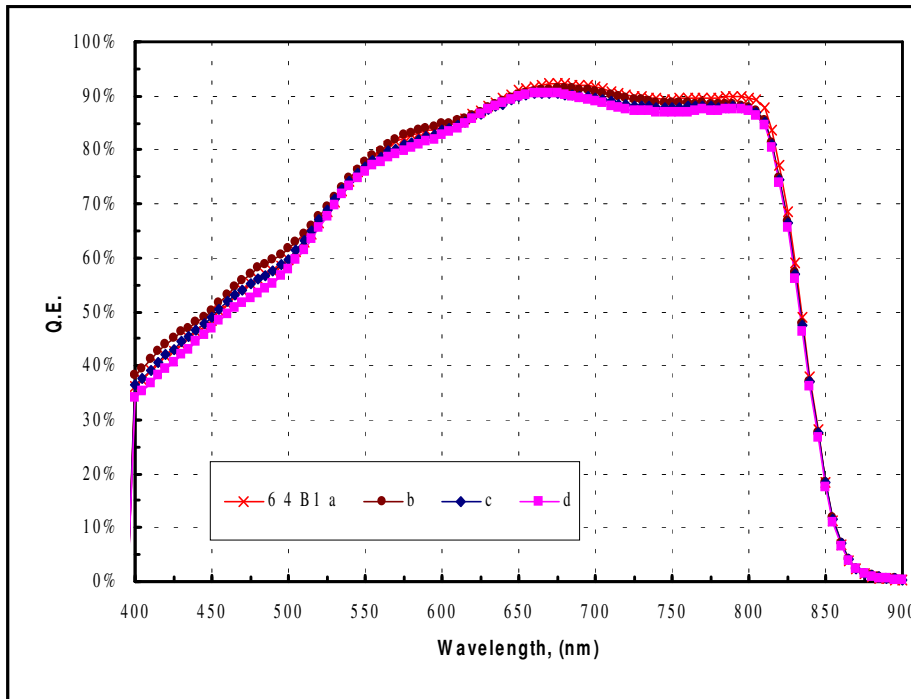
Spectral Response

400 deg C
80 min

From (nm)	To (nm)	Jsc	Current from device #1	QE#1	Current from device #2	QE#2	Current from device #3	QE#3	Current from device #4
Region #1	300	400	0.058937		0.062369		0.059505		0.055746
Region #2	400	510	2.998417		3.110904		3.013825		2.882678
Region #3	510	650	7.896348		7.920332		7.837102		7.76884
Region #4	650	800	9.224814		9.126515		9.043619		8.987868
Region #5	800	900	1.886782		1.848963		1.839814		1.810762
Total Jsc=			22.0653		22.06908		21.79387		21.50589

CdCl₂
Annealing **380 deg C**
CBD Time **80 min**

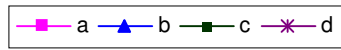
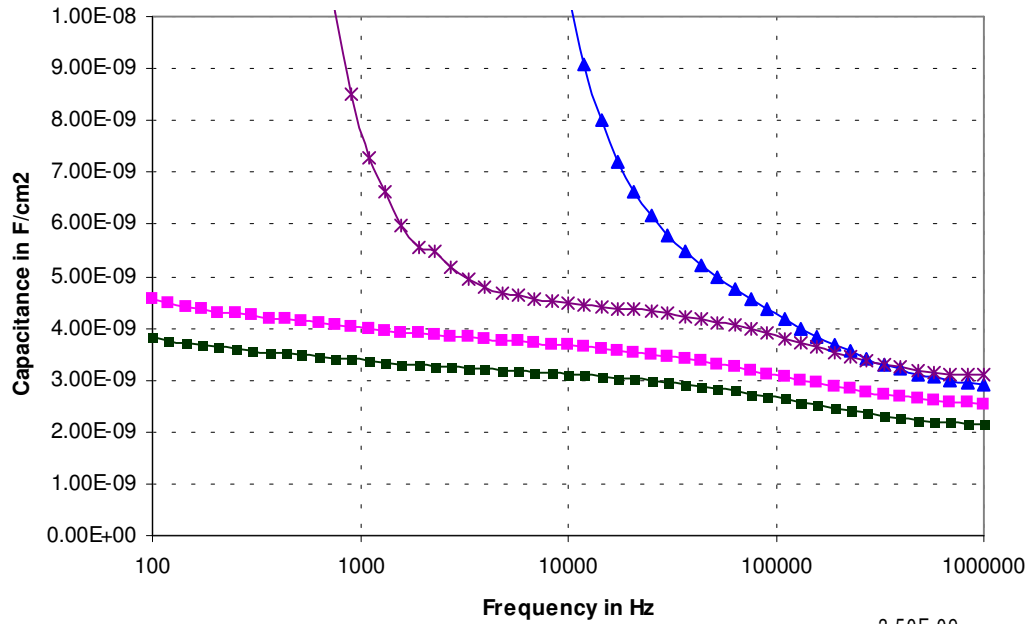
From (nm)	To (nm)	Jsc	Current from device #1	QE#1	Current from device #2	QE#2	Current from device #3	QE#3	Current from device #4
Region #1	300	400	0.07		0.065831		0.066270		0.062665
Region #2	400	510	3.36		3.344455		3.329612		3.240132
Region #3	510	650	8.39		8.424605		8.443568		7.984039
Region #4	650	800	9.39		9.390627		9.436805		8.907188
Region #5	800	900	2.23		2.247303		2.335933		2.233867
Total Jsc=			23.43		23.47		23.61		22.43



4 16 B9

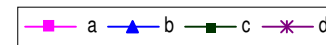
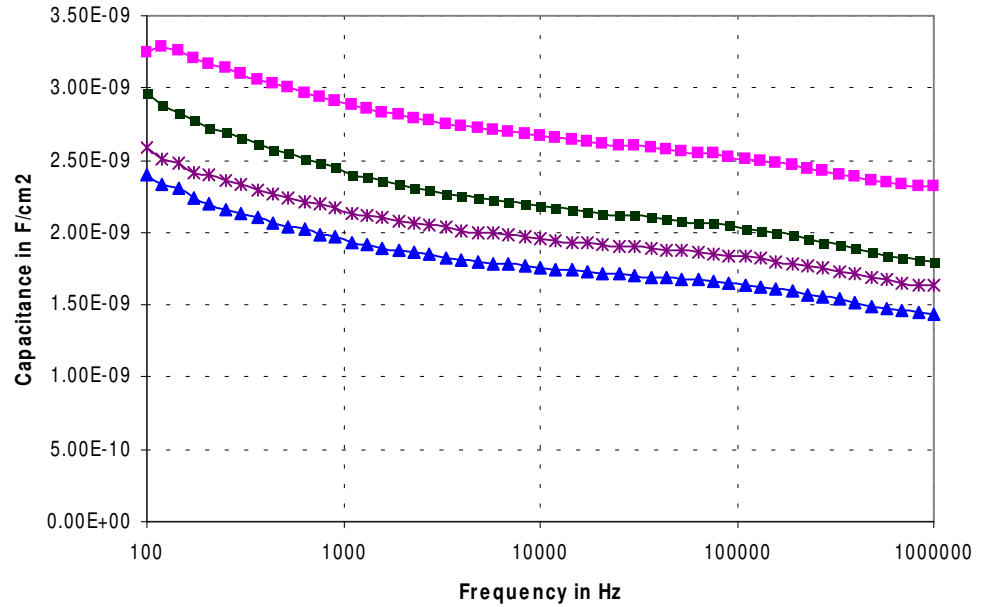
380 deg C/80 Min

C-F Curves

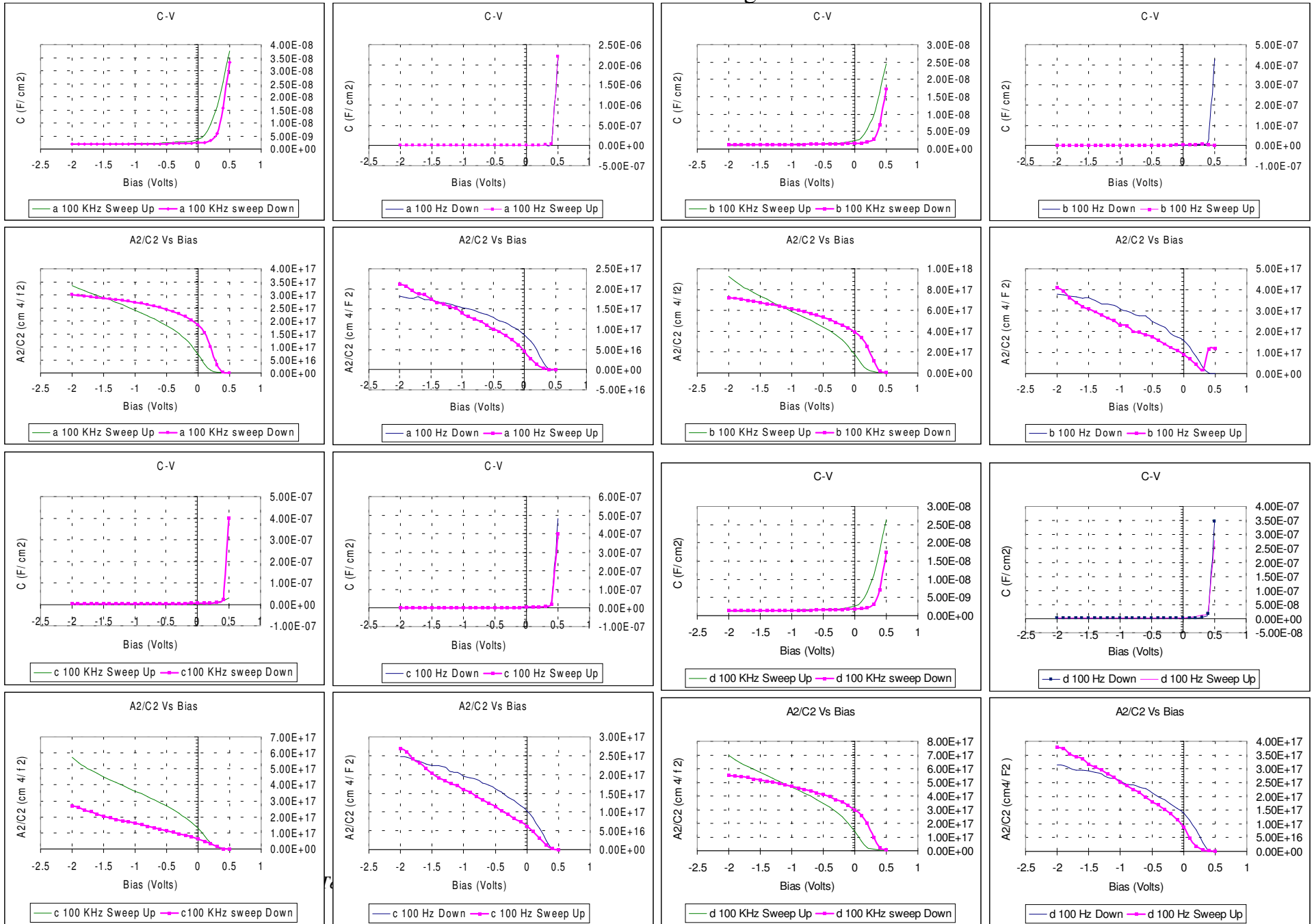


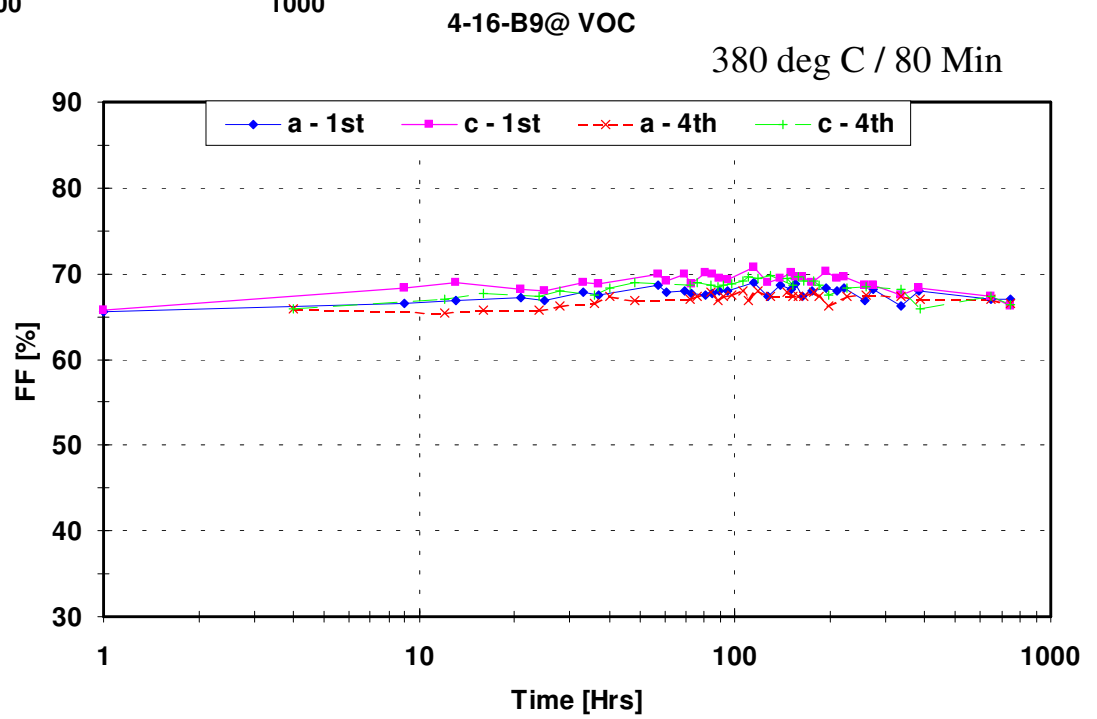
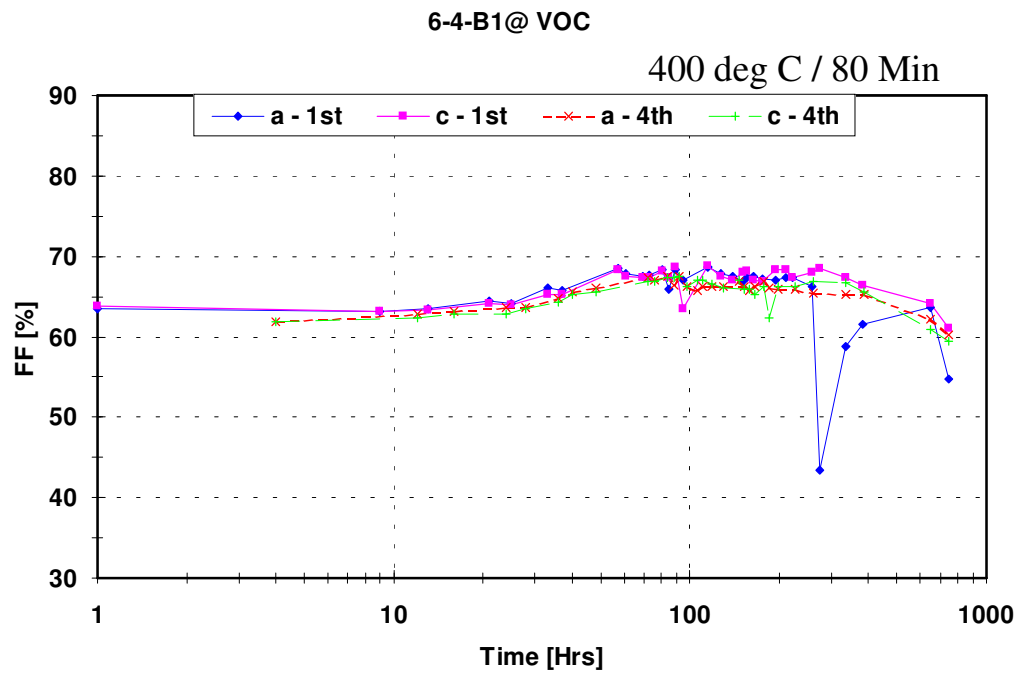
400 deg C/80 Min

6 4 B1

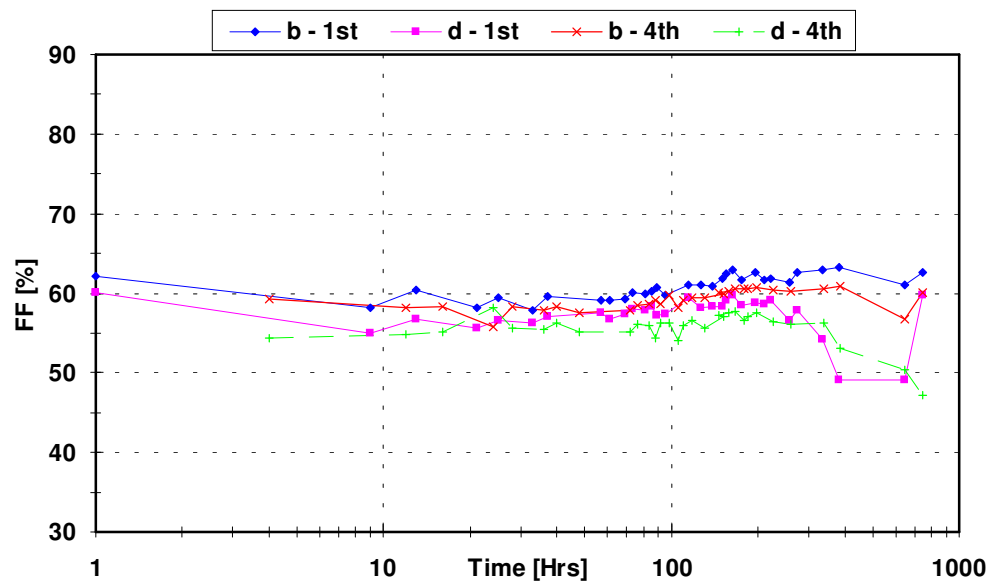


6 4 B1 400 deg C

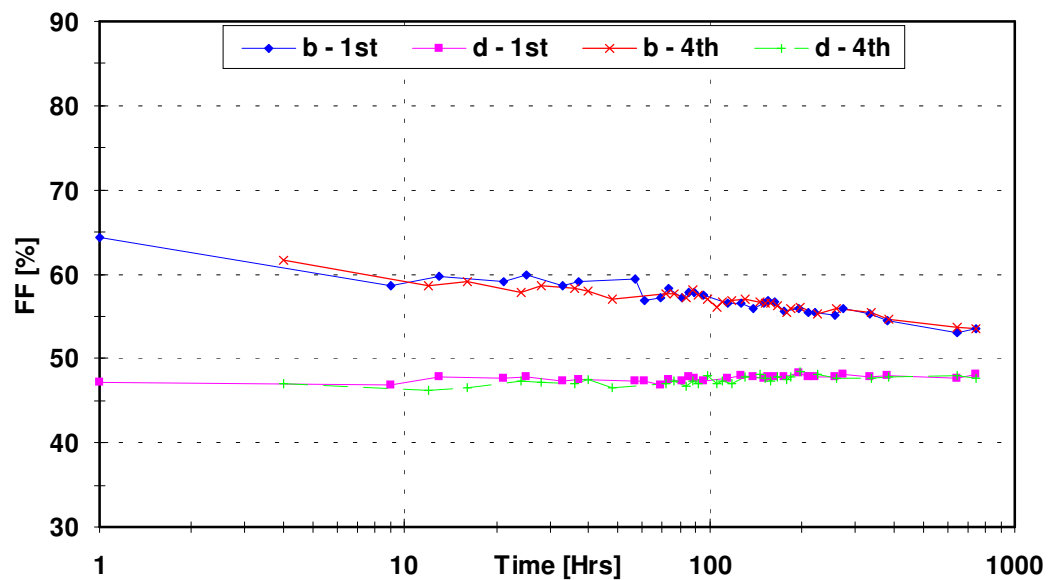




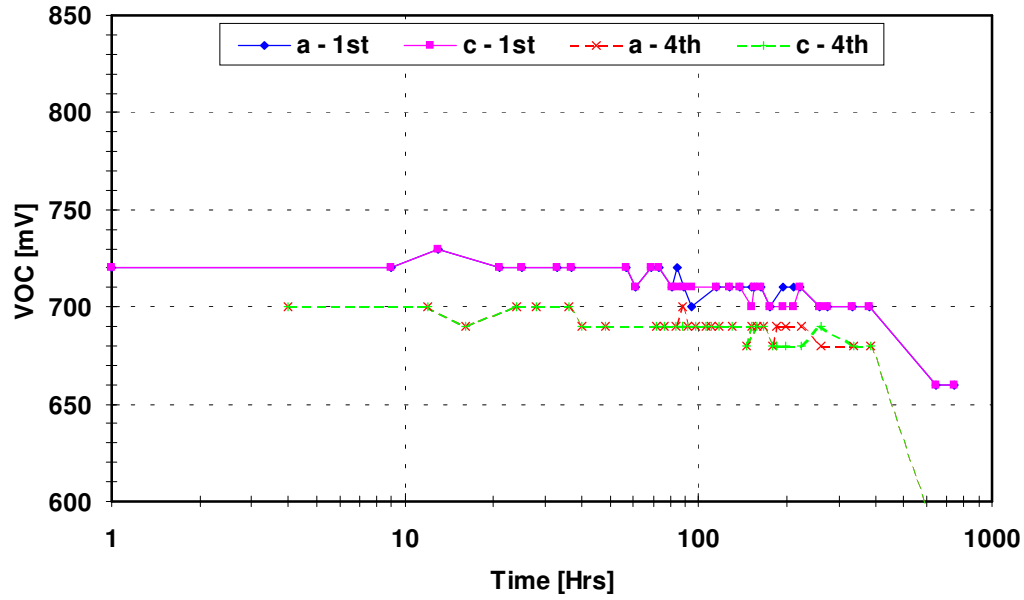
6-4-B1@JSC 400 deg C / 80 Min



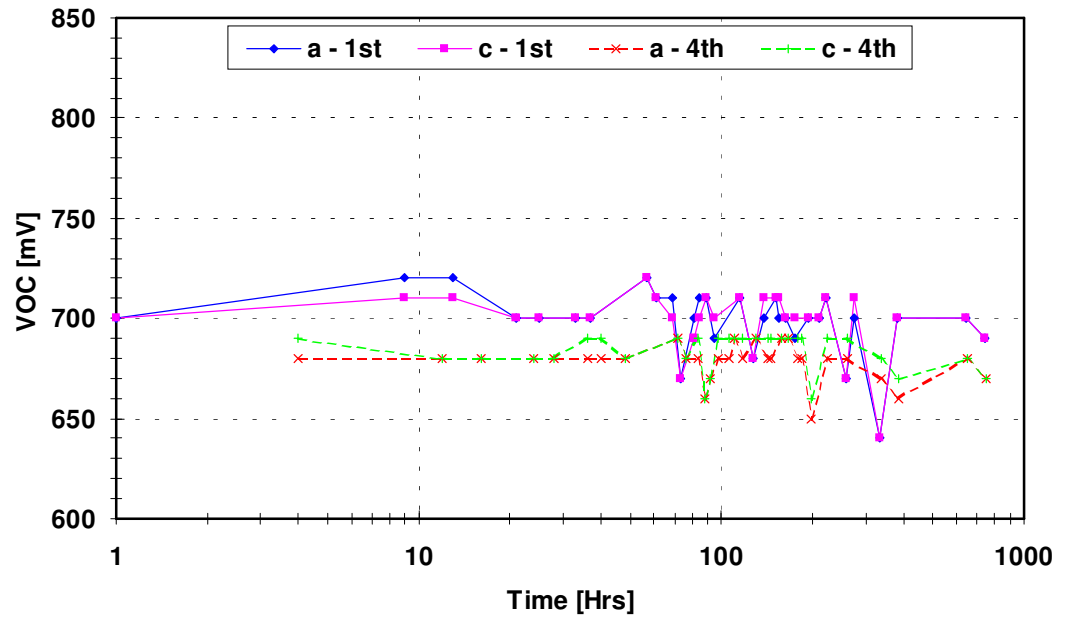
4-16-B9@JSC 380 deg C / 80 Min



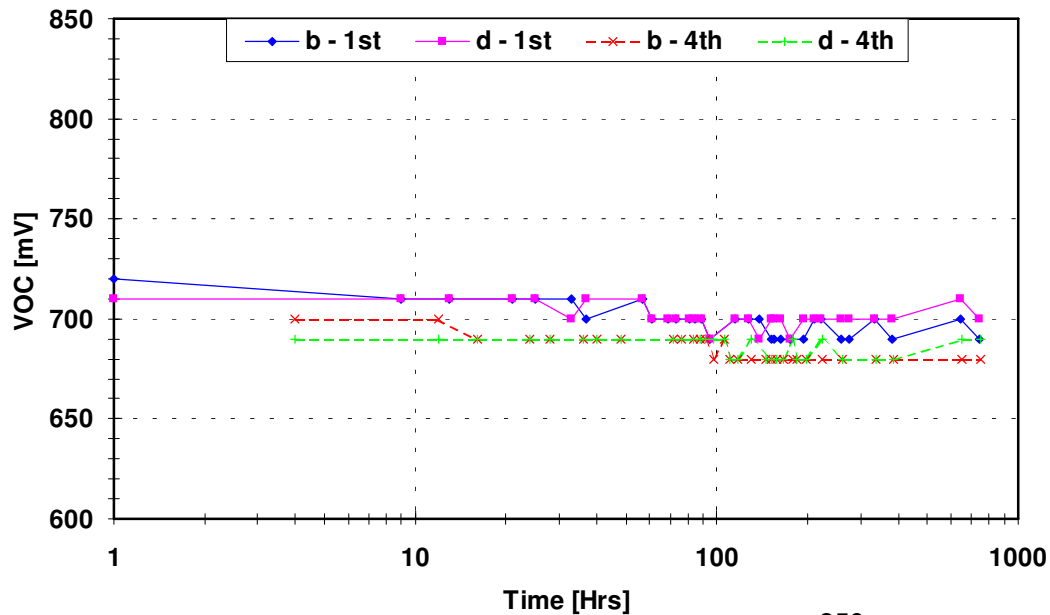
6-4-B1 @ VOC 400 deg C / 80 Min



4-16-B9 @ VOC 380 deg C / 80 Min



6-4-B1 @ JSC 400 deg C / 80 Min



4-16-B9 @ JSC 380 deg C / 80 Min

