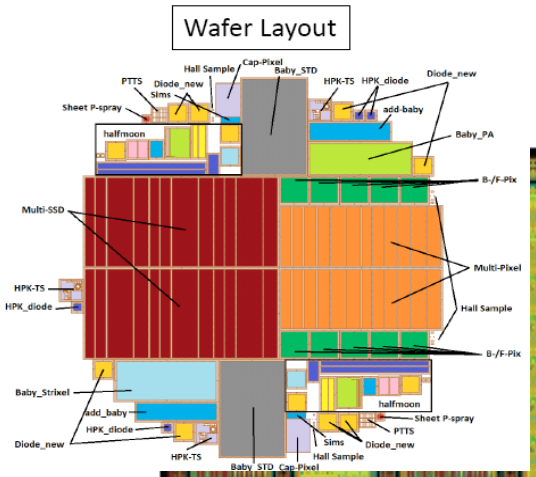
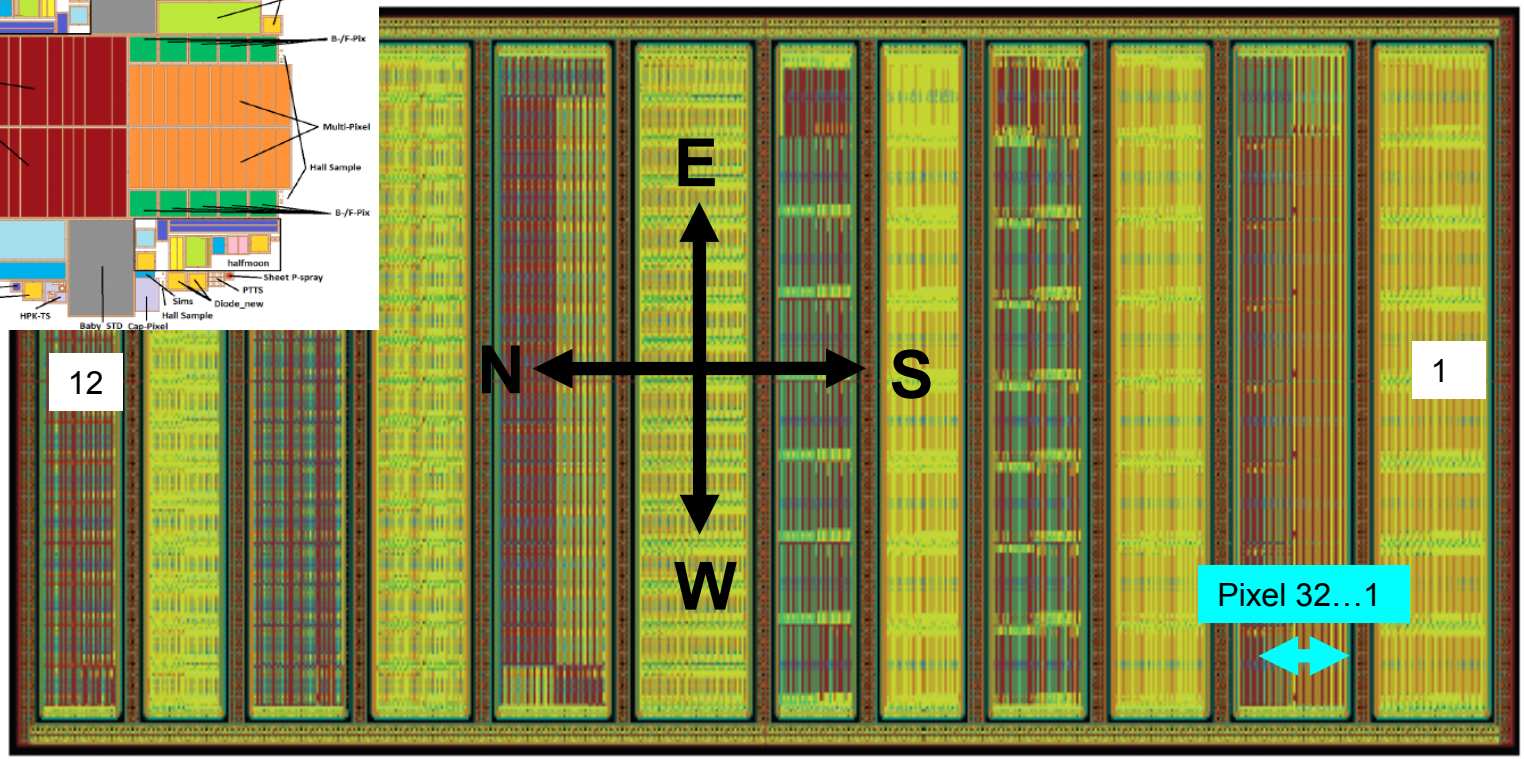
Mpix Sensors

Multi-Pixel



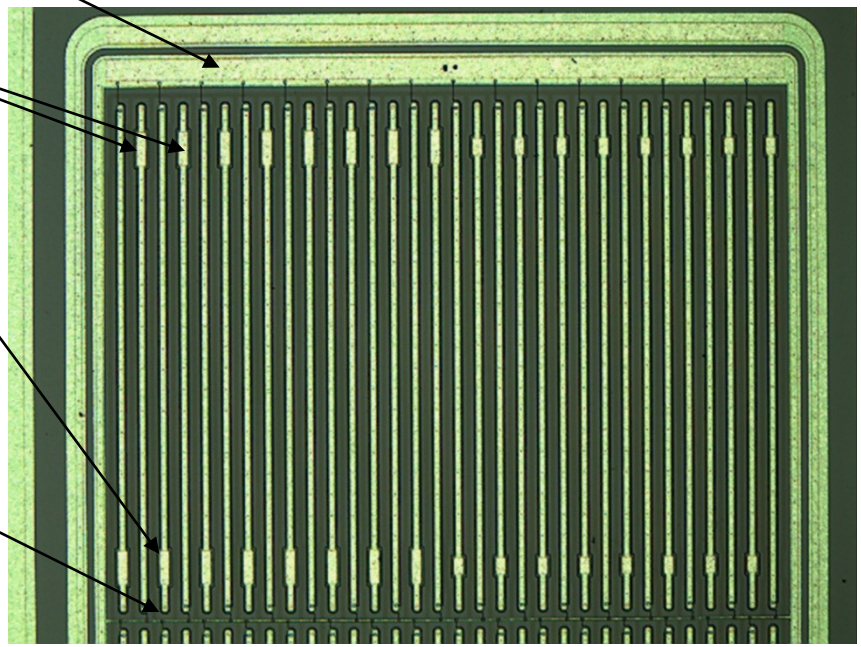


- 12 regions (3 ratios w/p, 2 diff. pixel lengths, 2 diff. Bias)

region	12	11	10	9	8	7	6	5	4	3	2	1
p+/n+	18	18	23	23	28	28	18	18	23	23	28	28
alu	31	31	36	36	41	41	31	31	36	36	41	41
length alu	1171	1171	1171	1171	1171	1171	2421	2421	2421	2421	2421	2421
pitch	80	80	100	100	120	120	80	80	100	100	120	120

Measurements

- C/V and I/V bias ring
- C_{int}, R_{int},
- I/V and C/V Pixel
- R_{bias}

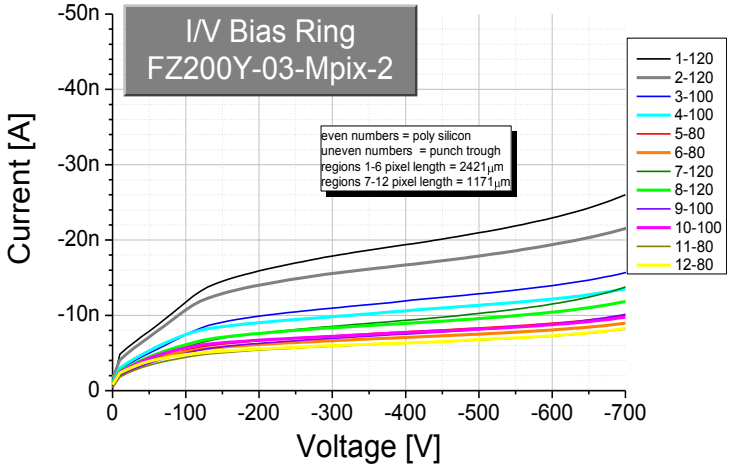


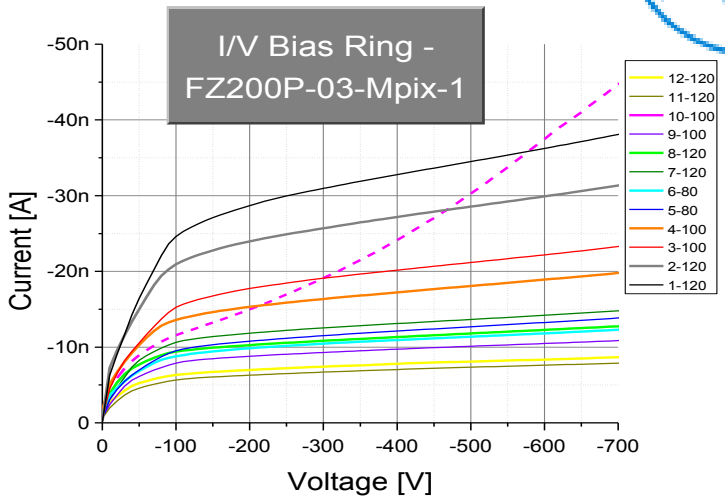
Measured sensors

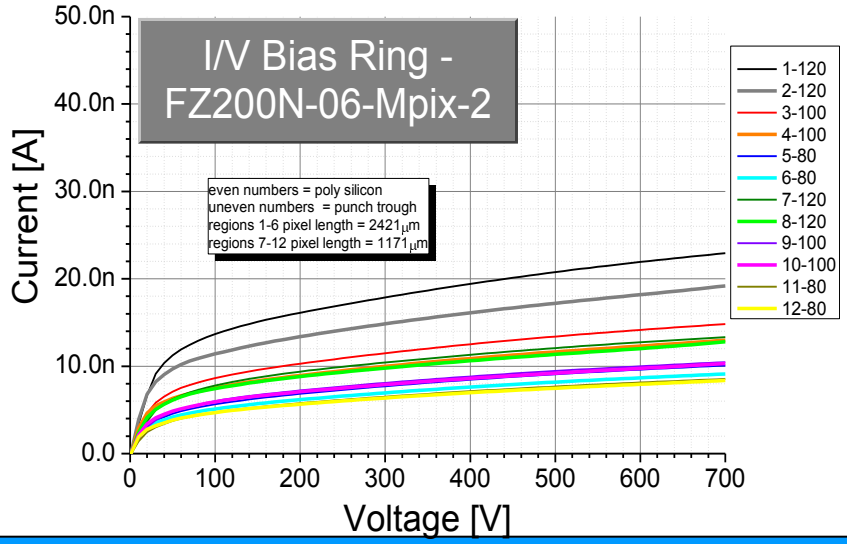
	Cint	CVbias	Rint	IVBias	Rbias	Itotal	Ctotal
FZ120N-05-Mpix-1	X	X	O	X	for Rpoly	x	x
FZ120Y-010-Mpix-2	X	X	O	X	for Rpoly	x	x
FZ200N-06-Mpix-2	X	X	O	X	for Rpoly	x	x
FZ200P-03-Mpix-1	X	X	O	X	for Rpoly		
FZ200Y-03-Mpix-1	X	X	O	X	for Rpoly		
FZ200Y-03-Mpix-2	X	X	O	X	for Rpoly	x	x
FZ320N-03-Mpix-2	X	X	O	X	for Rpoly	x	x
FZ320Y-06-Mpix-1	X	X	O	X	for Rpoly	x	x
FZ320P-02-Mpix-2	X	X	O	X	for Rpoly		
			O measured but only information that Rint<<Rbias				

-> Sensors had no ceramic support and was send back to CERN (setup up for glued sensors is under construction)

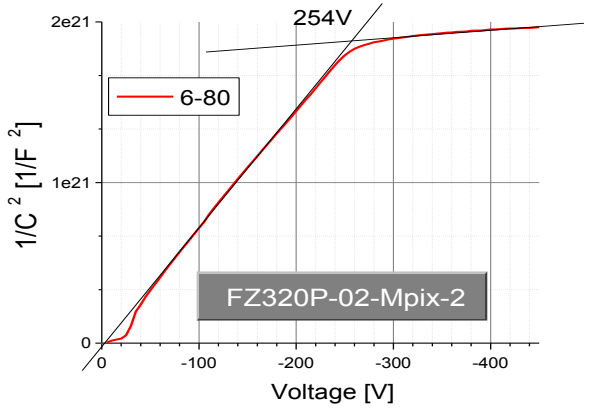
Bias Ring I/V

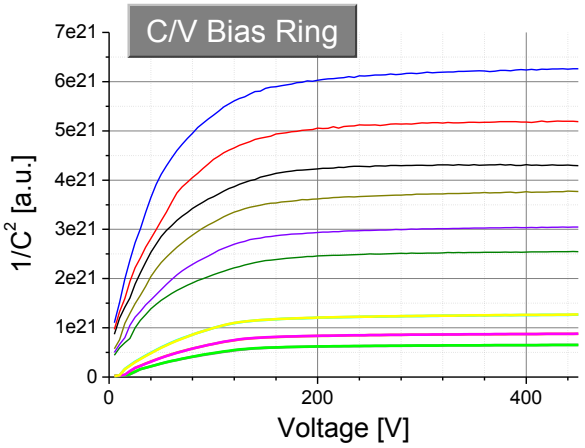

I/V Bias Ring
FZ200Y-03-Mpix-2
even numbers = poly silicon
uneven numbers = punch trough
regions 1-6 pixel length = 2421µm
regions 7-12 pixel length = 1171µm
Current [A]
Voltage [V]
-50n
-40n
-30n
-20n
-10n
0
0
-100
-200
-300
-400
-500
-600
-700
1-120
2-120
3-100
4-100
5-80
6-80
7-120
8-120
9-100
10-100
11-80
12-80

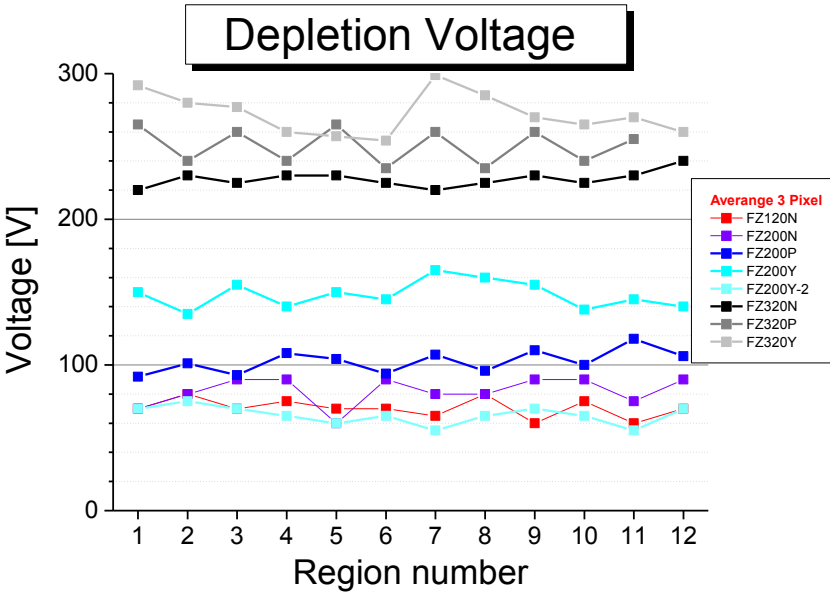

I/V Bias Ring -
FZ200P-03-Mpix-1
Current [A]
Voltage [V]
-50n
-40n
-30n
-20n
-10n
0
0
-100
-200
-300
-400
-500
-600
-700
12-120
11-120
10-100
9-100
8-120
7-120
6-80
5-80
4-100
3-100
2-120
1-120


I/V Bias Ring -
FZ200N-06-Mpix-2
even numbers = poly silicon
uneven numbers = punch trough
regions 1-6 pixel length = 2421µm
regions 7-12 pixel length = 1171µm
Current [A]
Voltage [V]
50.0n
40.0n
30.0n
20.0n
10.0n
0.0
0
100
200
300
400
500
600
700
1-120
2-120
3-100
4-100
5-80
6-80
7-120
8-120
9-100
10-100
11-80
12-80

Depletion Voltage from Bias ring C/V

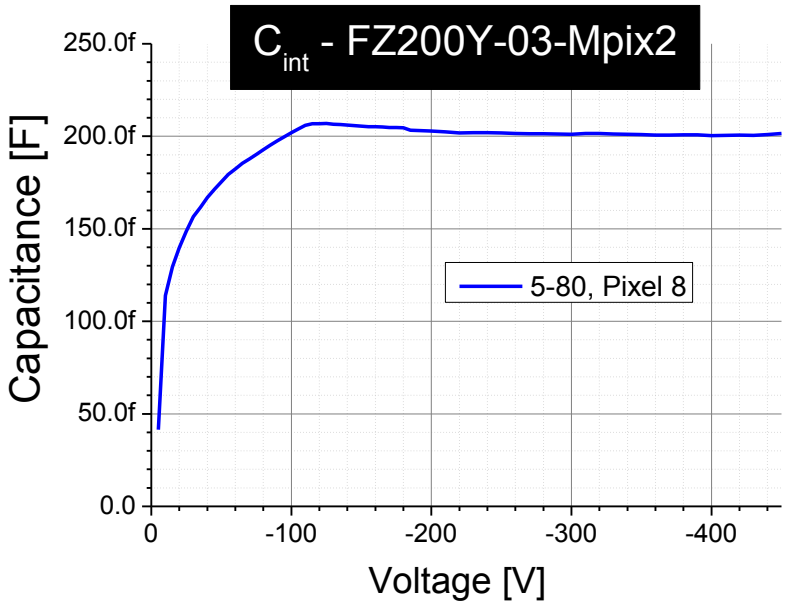


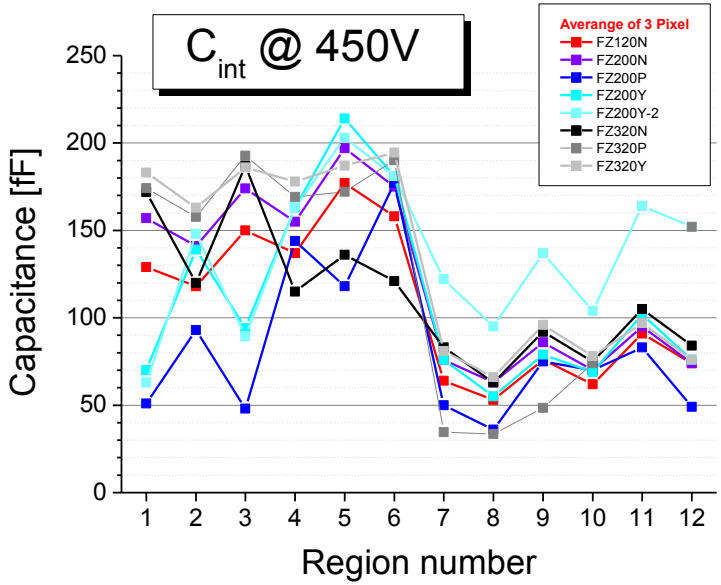


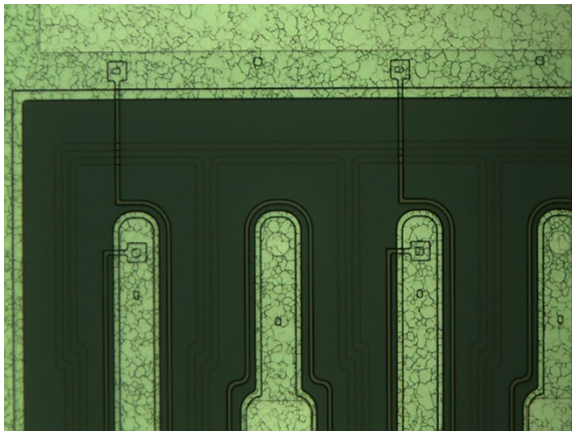


C_{int}

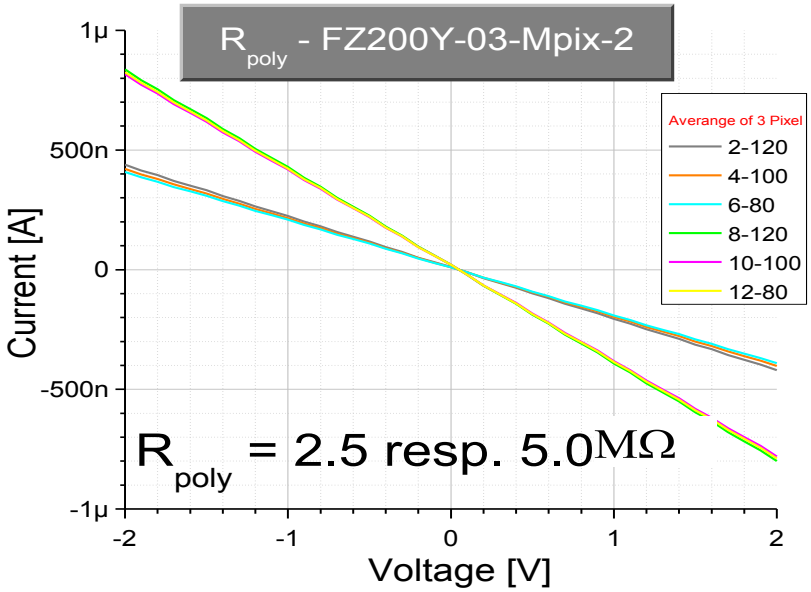
even numbers = poly silicon
uneven numbers = punch trough
regions 1-6 pixel length = 2421mm
regions 7-12 pixel length = 1171mm

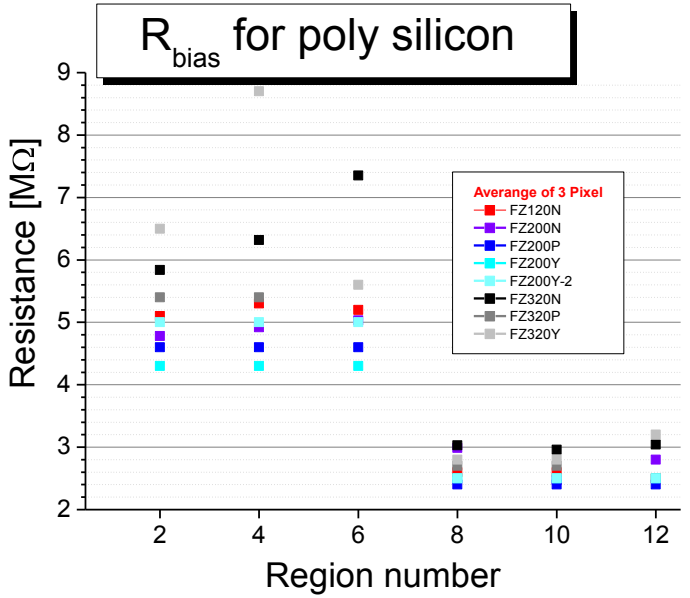




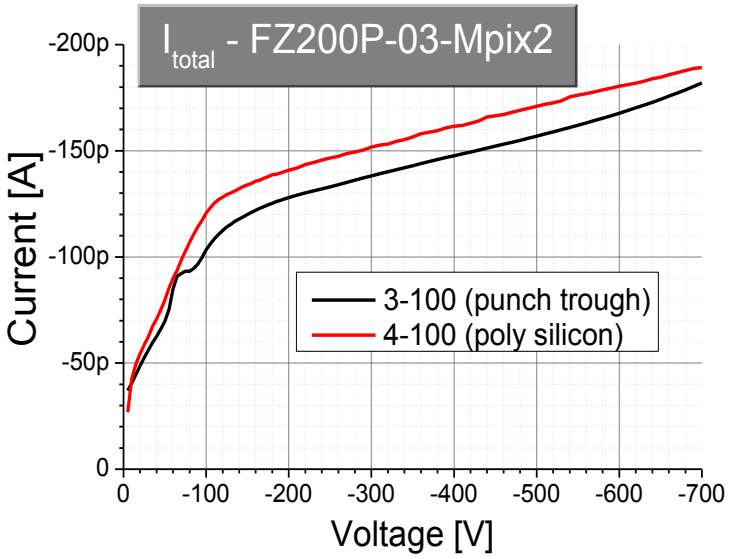


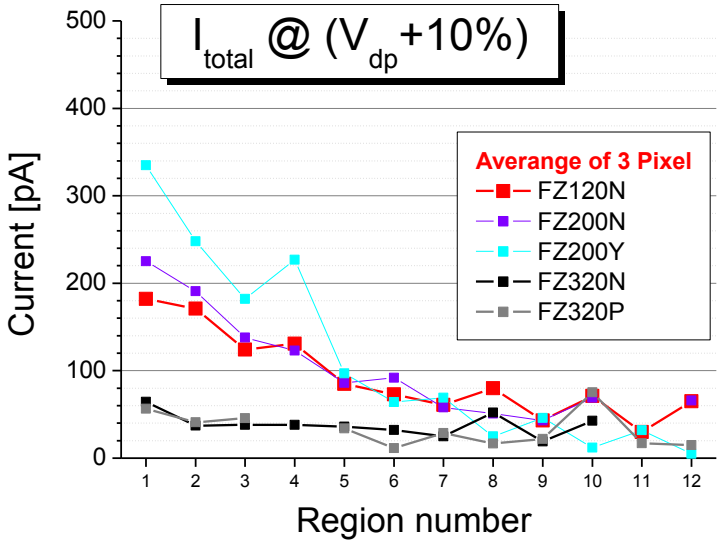
R_{Bias} for poly silicon



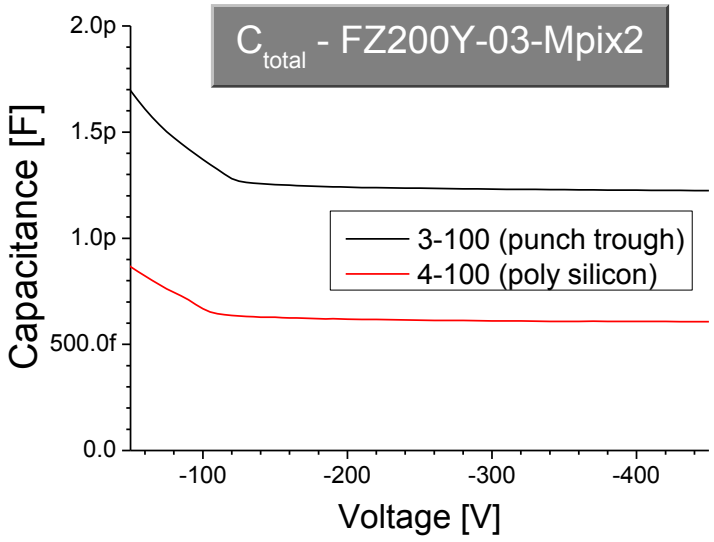


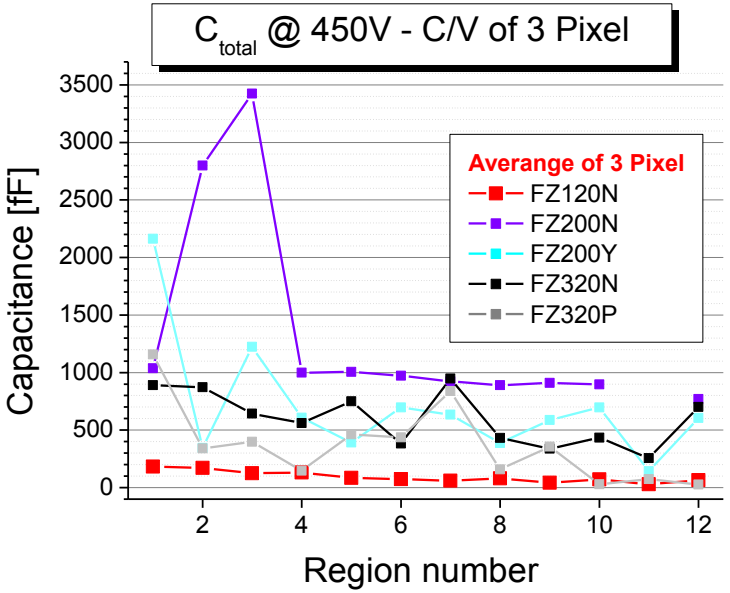
I/V Pixel


I total - FZ200P-03-Mpix2
Current [A]
Voltage [V]
-200p
-150p
-100p
-50p
0
0
-100
-200
-300
-400
-500
-600
-700
3-100 (punch trough)
4-100 (poly silicon)

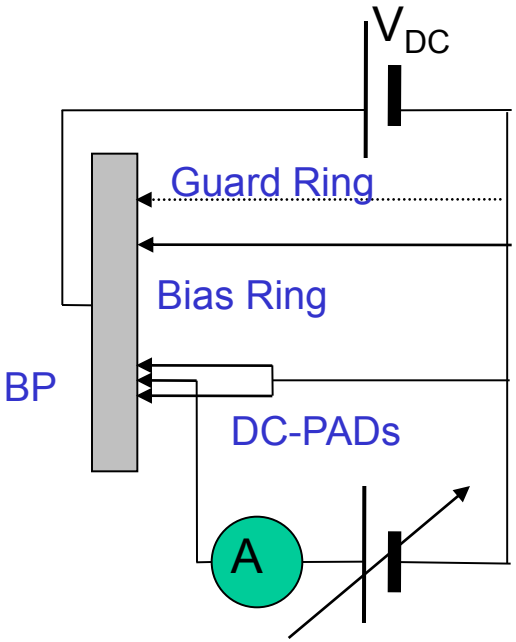

I total @ (V dp +10%)
Current [pA]
Region number
500
400
300
200
100
0
1
2
3
4
5
6
7
8
9
10
11
12
Averange of 3 Pixel
FZ120N
FZ200N
FZ200Y
FZ320N
FZ320P

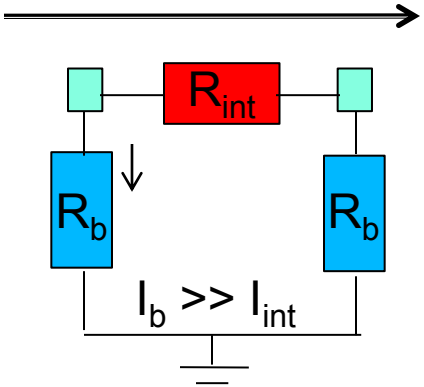
C/V Pixel

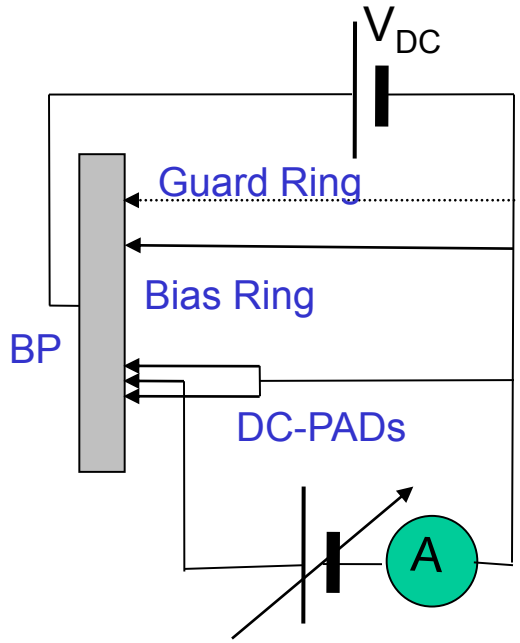

C total - FZ200Y-03-Mpix2
Capacitance [F]
2.0p
1.5p
1.0p
500.0f
0.0
-100
-200
-300
-400
Voltage [V]
3-100 (punch trough)
4-100 (poly silicon)

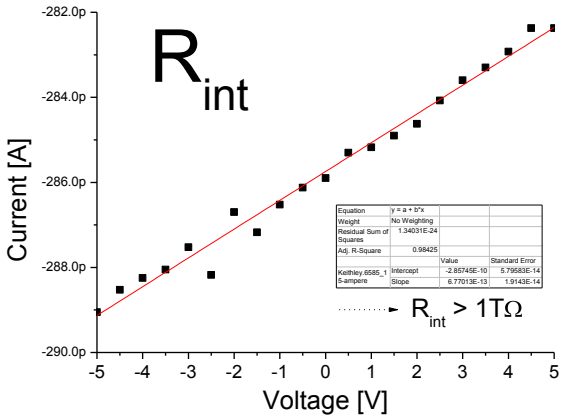

C total @ 450V - C/V of 3 Pixel
Capacitance [fF]
3500
3000
2500
2000
1500
1000
500
0
2
4
6
8
10
12
Region number
Averange of 3 Pixel
FZ120N
FZ200N
FZ200Y
FZ320N
FZ320P

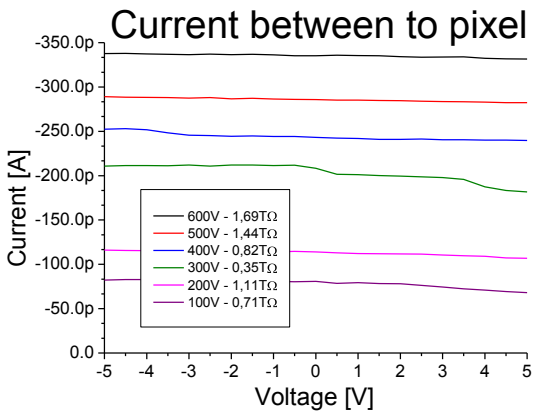
R_{int}


V_{DC}
Guard Ring
Bias Ring
BP
DC-PADs
A

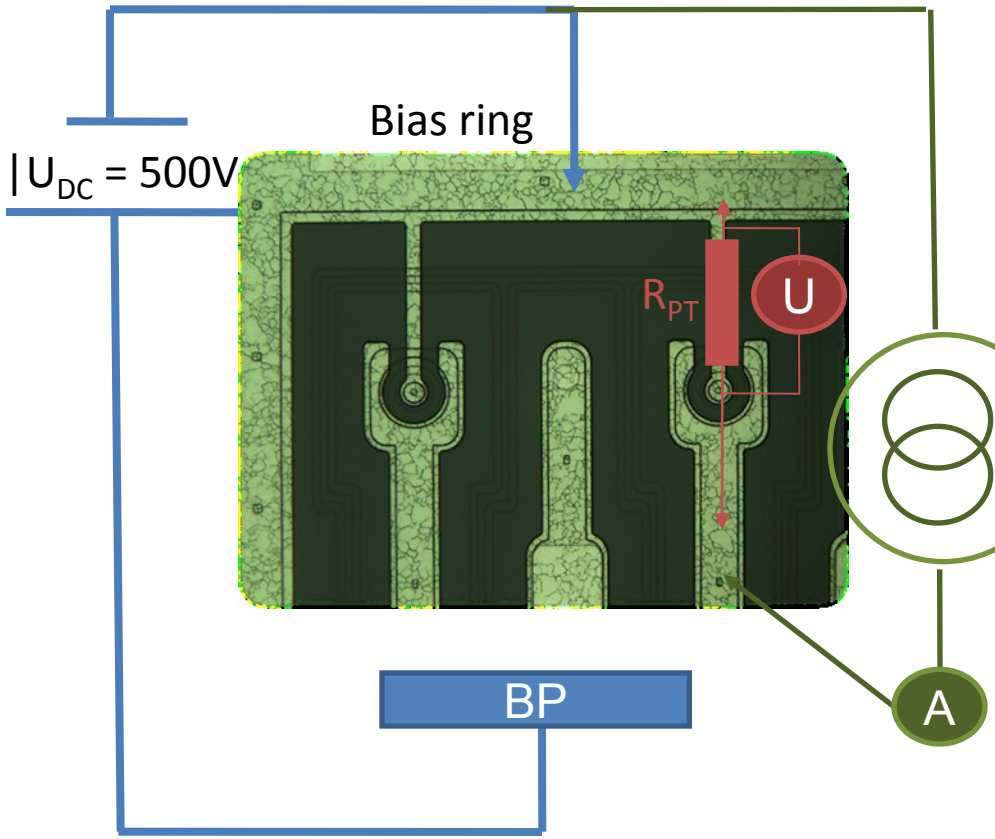

R_{int}
R_b
R_b
$I_b >> I_{int}$

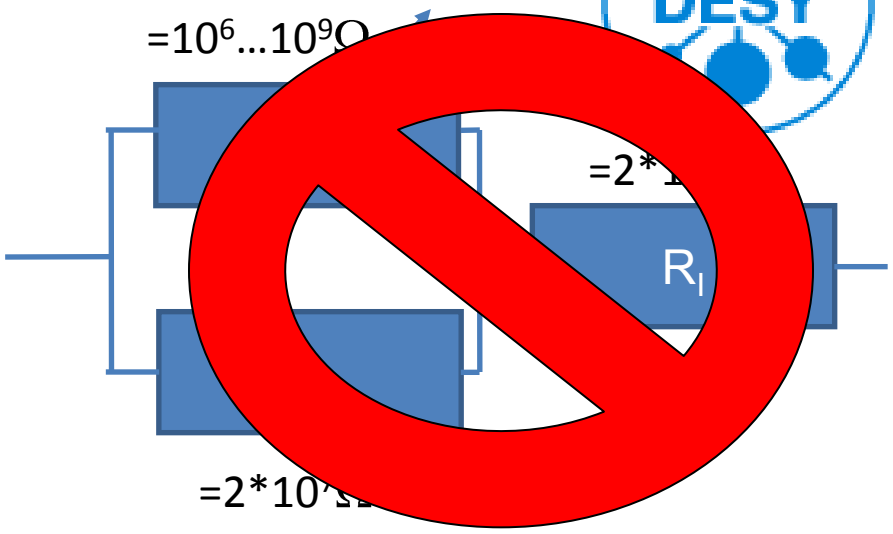

V_{DC}
Guard Ring
Bias Ring
BP
DC-PADs
A

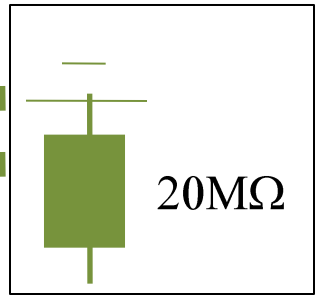

R_{int}
Current [A]
Voltage [V]
R_{int} > 1TΩ


Current between to pixel
Current [A]
Voltage [V]
600V - 1,69TΩ
500V - 1,44TΩ
400V - 0,82TΩ
300V - 0,35TΩ
200V - 1,11TΩ
100V - 0,71TΩ

R_{punch}







-> Electrometer and current source is needed

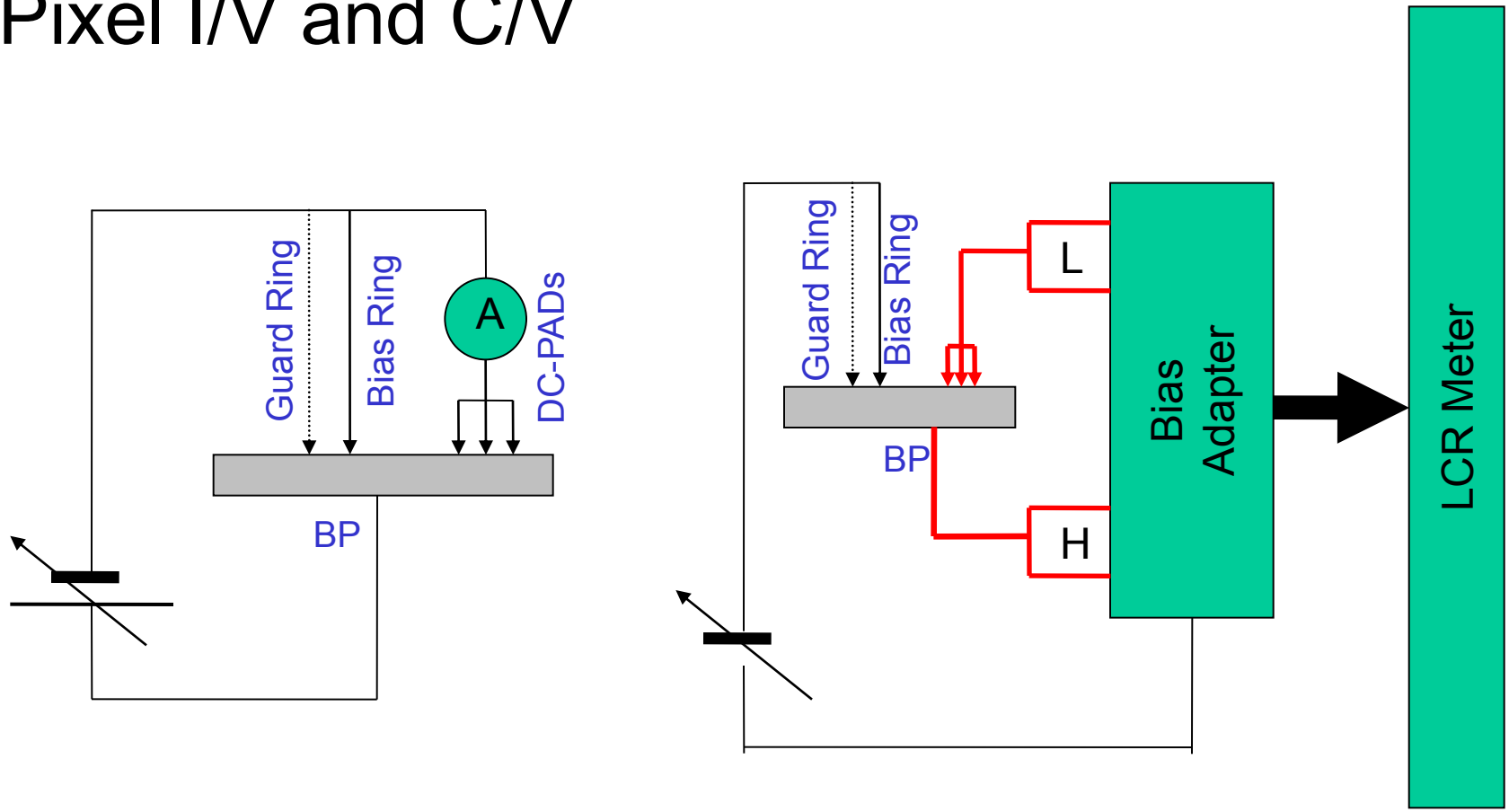
Open Points

- **Switching matrix is in preparation**
- Setup up for glued sensors is planed by an engineer
- Alibava read out electronic arrived Zeuthen and first tests was done, now we have to give the final construction for a measurement setup to an engineer (thanks to Karlsruhe & Hamburg for disscussions)

Appendix

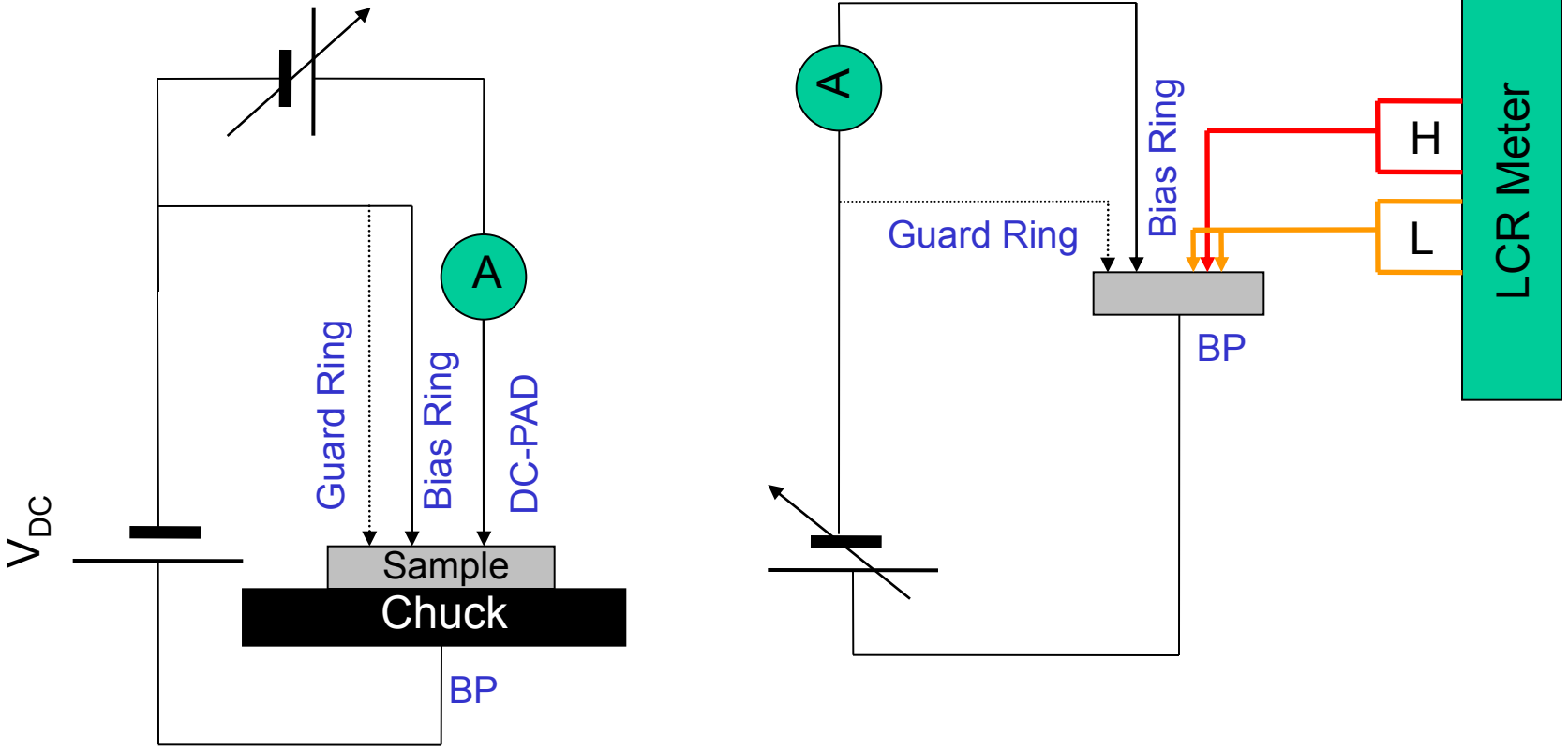
Measurement setup -1

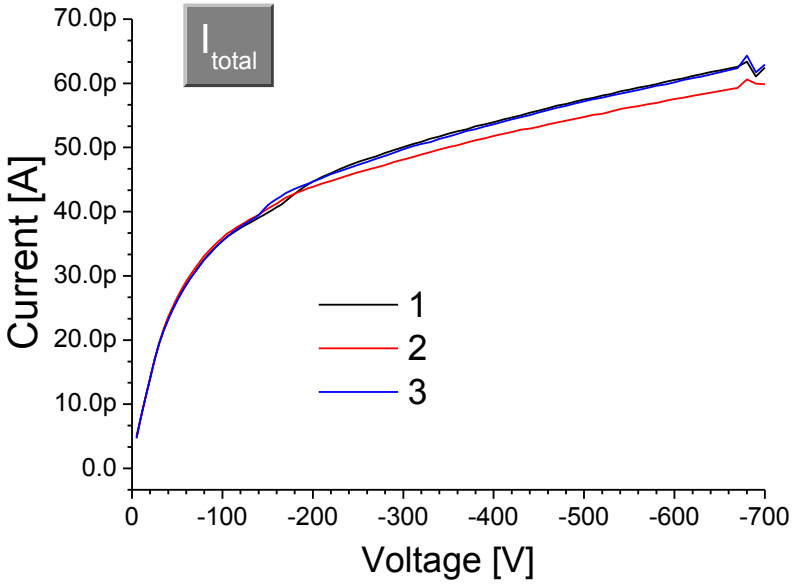
Pixel I/V and C/V

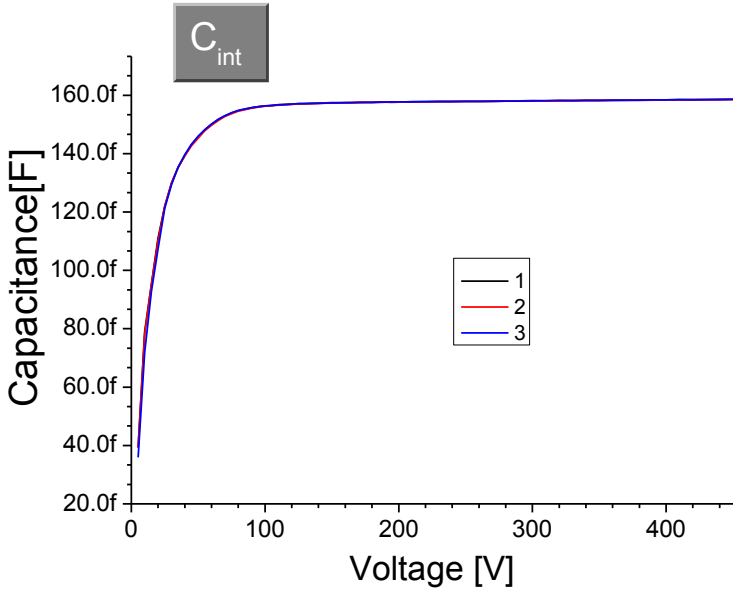


Measurement setup -2

R_{bias} and C_{int}




I total
70.0p
60.0p
50.0p
40.0p
30.0p
20.0p
10.0p
0.0
Current [A]
0
-100
-200
-300
-400
-500
-600
-700
Voltage [V]
1
2
3


C int
160.0f
140.0f
120.0f
100.0f
80.0f
60.0f
40.0f
20.0f
Capacitance[F]
0
100
200
300
400
Voltage [V]
1
2
3