RD50-MPW2 I-V Measurements on test matrices at IFIC

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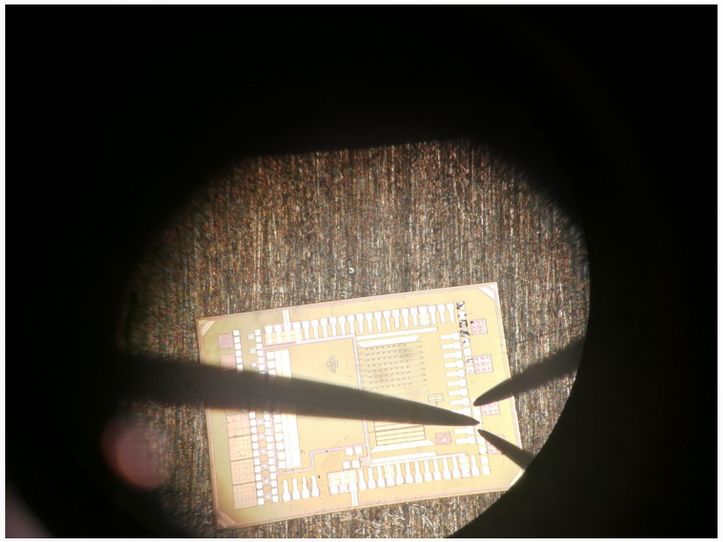
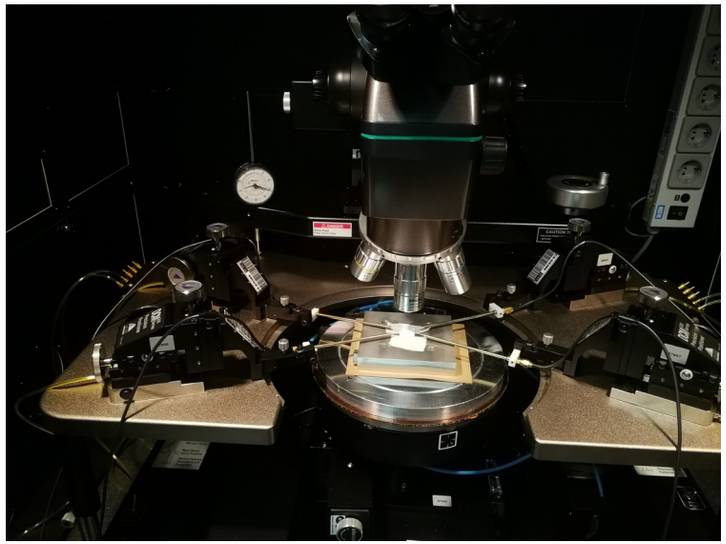
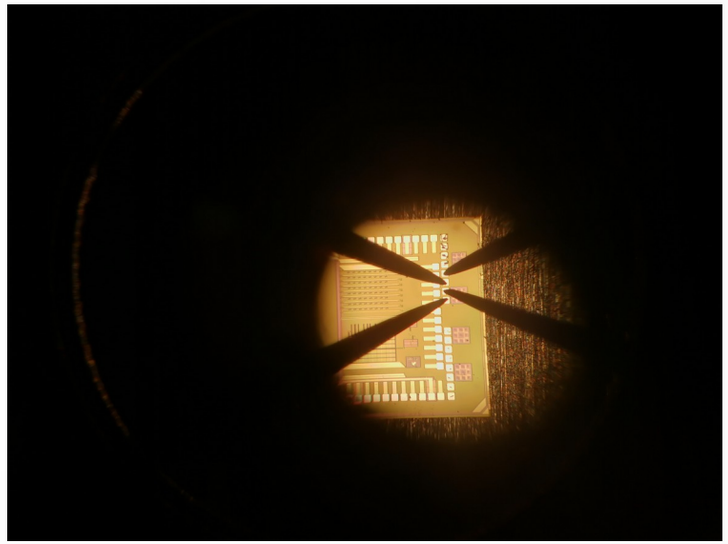
RD50-MPW2 I-V measurements: setup

- Measured I-V on test matrices of MPW2.
- W7, W8, W10, W11, W13 and W14 devices measured.
- All test matrices measured.
- Matrix central pixel measured (pixel HV return pad and GND pad connected together at source GND, HV pad connected to source HV) (W7, W10, W13 → 1st, 2nd and 3rd chips).
- Other configuration used: 8 surrounding pixels connected to GND (W7, W13 → 4th chip and W8, W11, W14).
- Keithley 237 source meter used: different current compliance/measurement range used to be able to measure breakdown voltage.

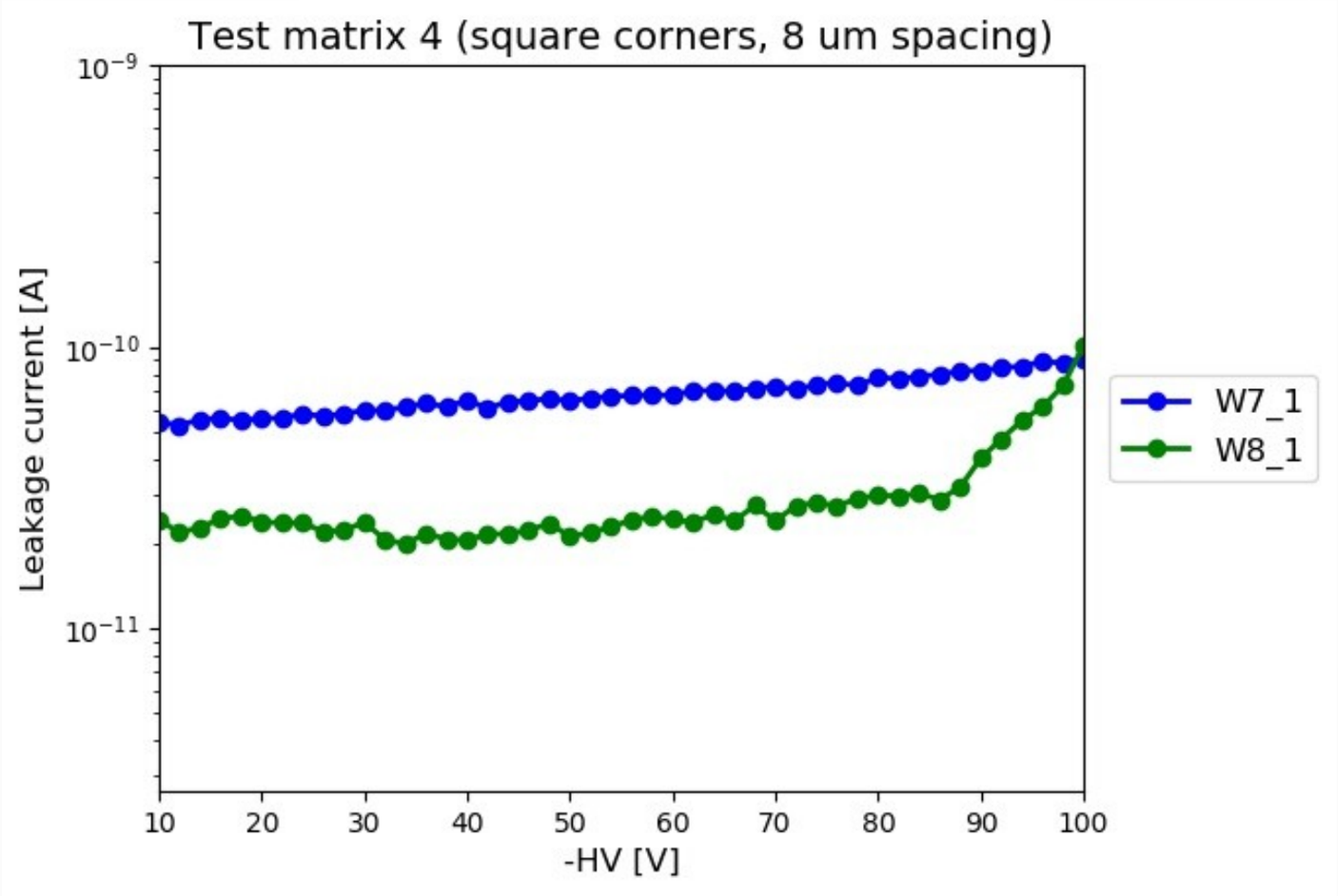






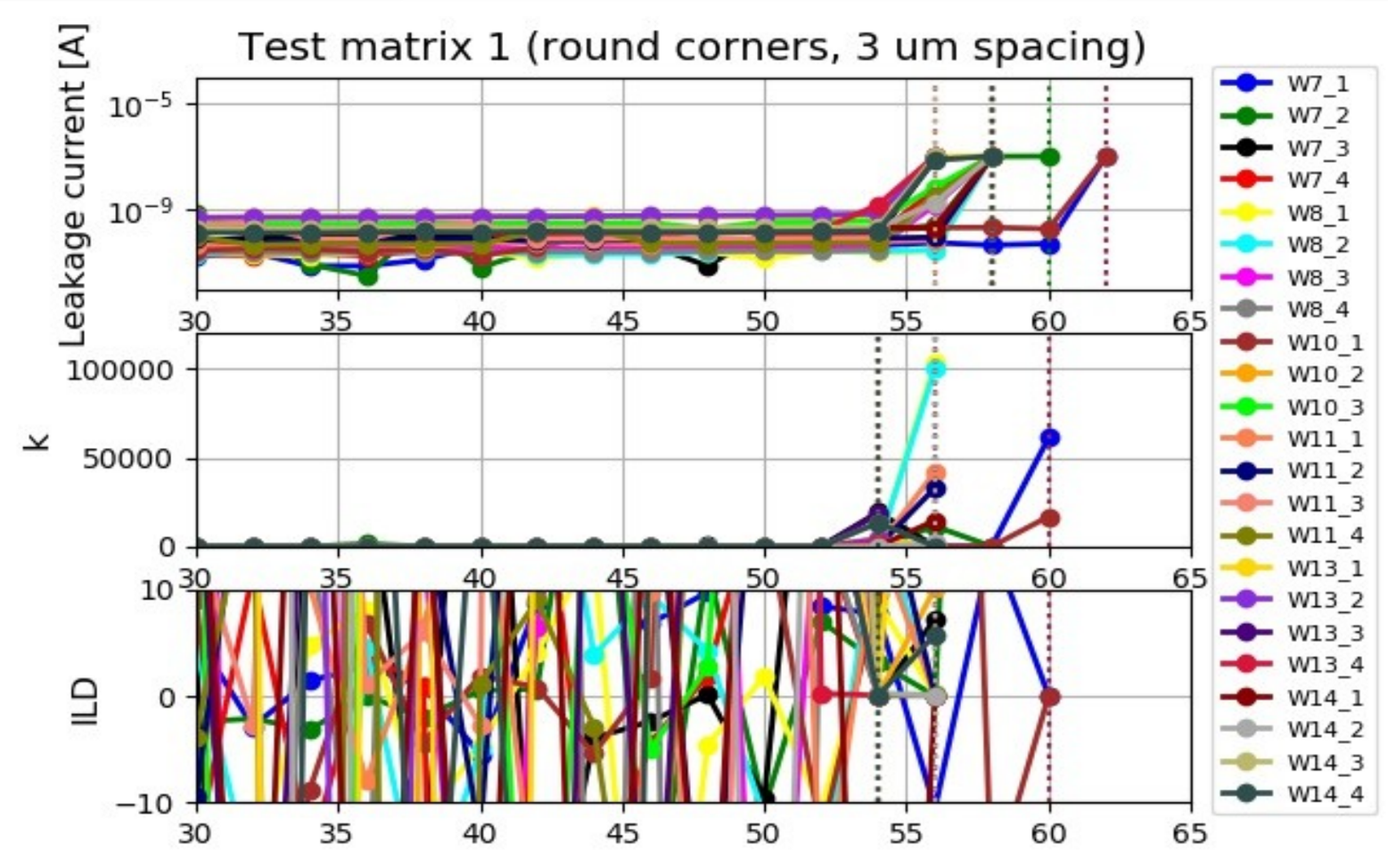
RD50-MPW2 I-V measurements

- Measurements of the leakage current.
- W7_1 → 3 needles set-up.
- W8_1 → 4 needles set-up.



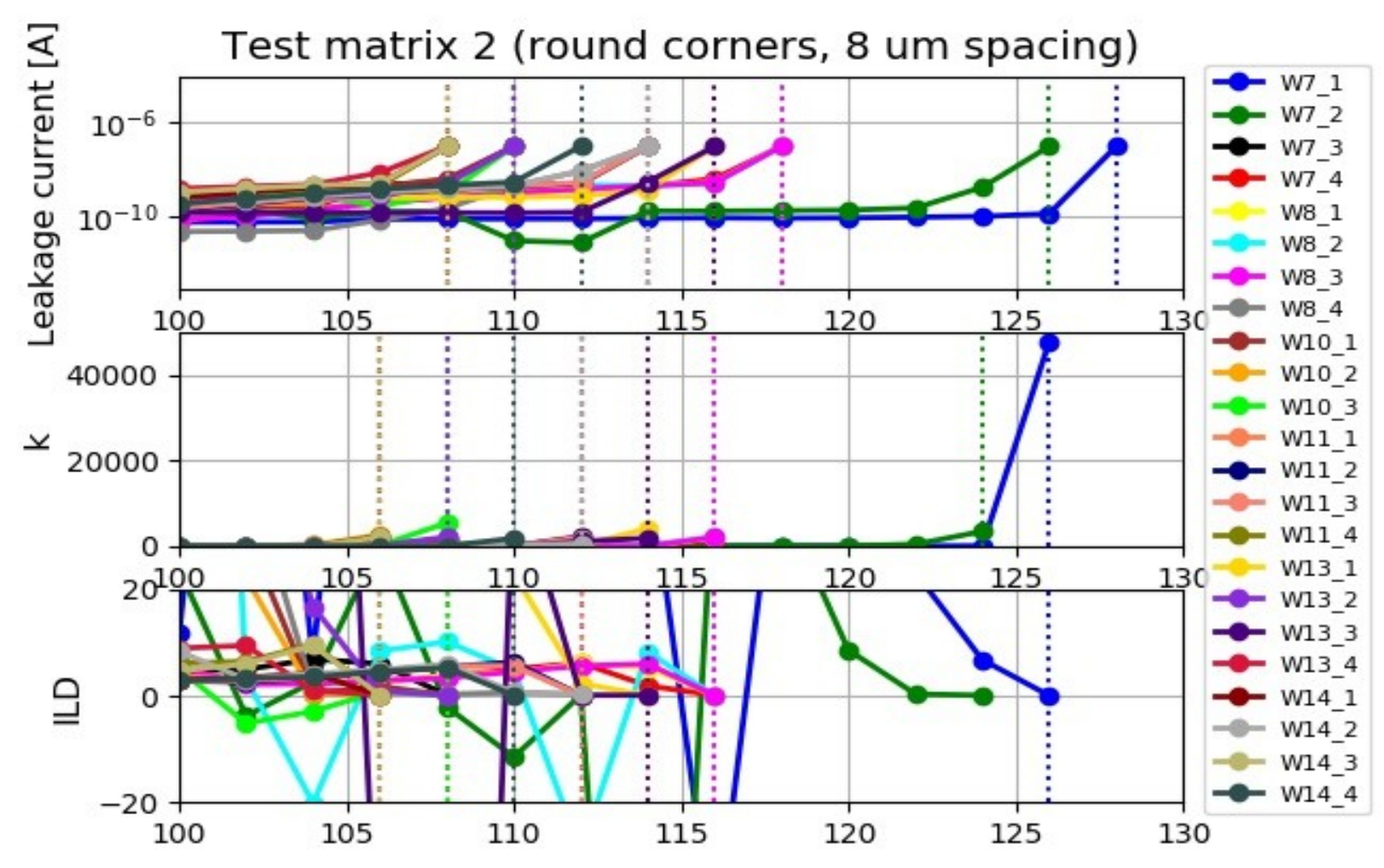
RD50-MPW2 I-V measurements

- First matrix: 3 µm spacing/round corners.
- W7, W8 (0.5-1.1 kΩ·cmcm), W10, W11 (1.9 kΩ·cmcm) and W13, W14 (> 2 kΩ·cmcm) devices.
- Source current compliance 100 nA.
- Vertical lines pointing to V(Icomp), V(kmax) and V(ILDmin > 0) in each plot.



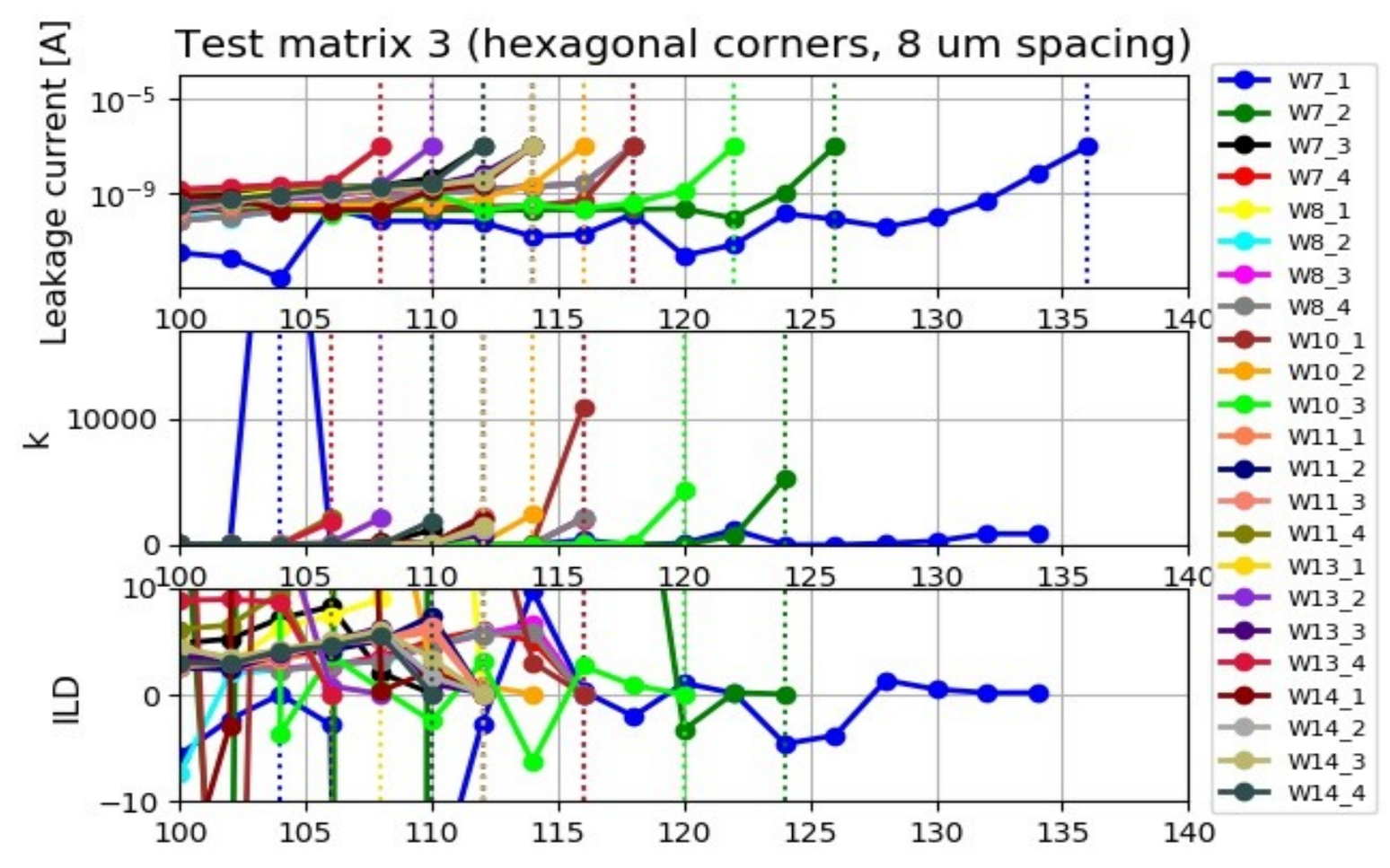
RD50-MPW2 I-V measurements

- Second matrix: 8 µm spacing/round corners.
- W7, W8 (0.5-1.1 kΩ·cmcm), W10, W11 (1.9 kΩ·cmcm) and W13, W14 (> 2 kΩ·cmcm) devices.
- Source current compliance 10 nA.
- Vertical lines pointing to V(Icomp), V(kmax) and V(ILDmin > 0) in each plot.



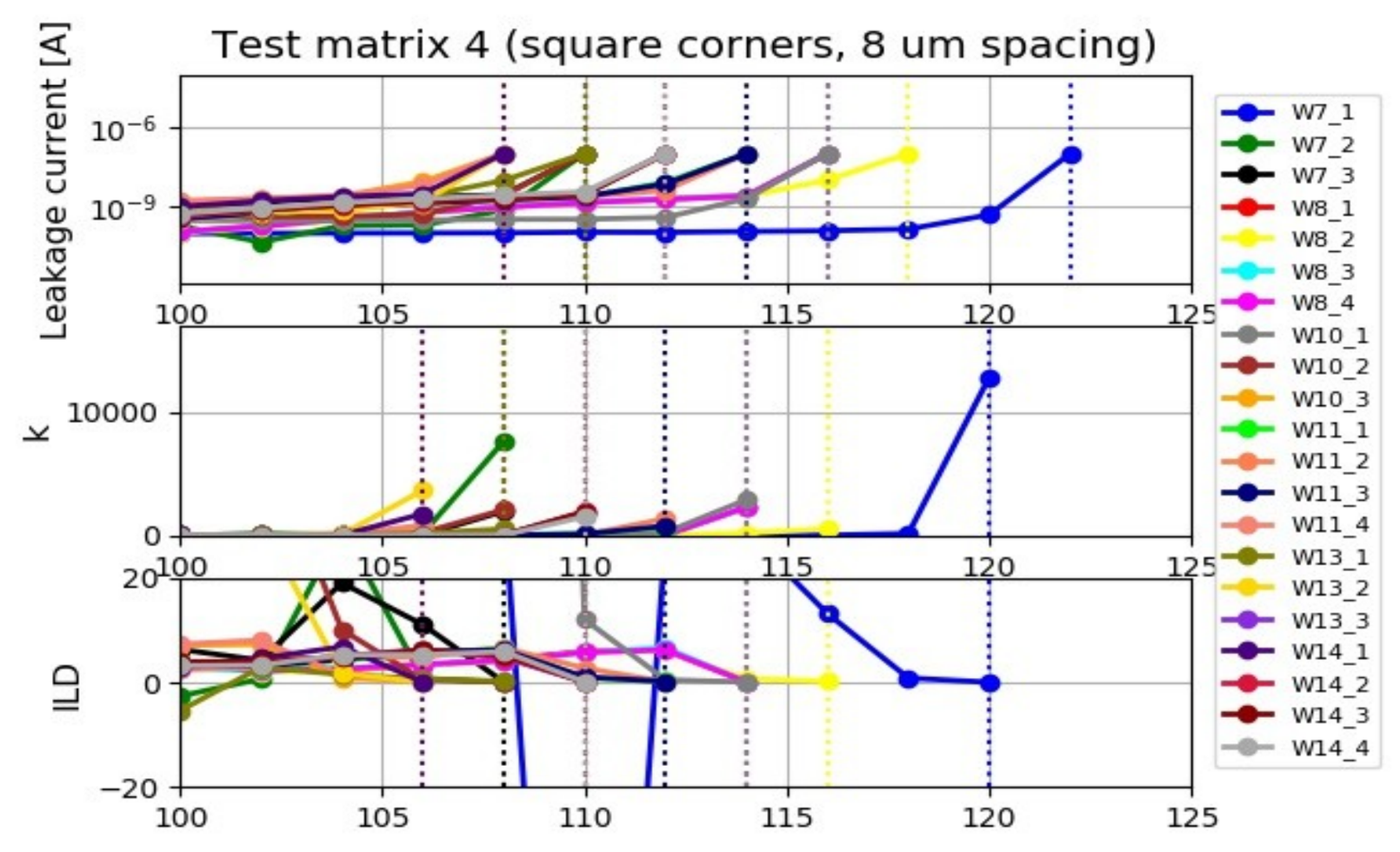
RD50-MPW2 I-V measurements

- Third matrix: 8 µm spacing/hexagonal corners.
- W7, W8 (0.5-1.1 kΩ·cmcm), W10, W11 (1.9 kΩ·cmcm) and W13, W14 (> 2 kΩ·cmcm) devices.
- Source current compliance 100 nA.
- Vertical lines pointing to V(Icomp), V(kmax) and V(ILDmin > 0) in each plot.



RD50-MPW2 I-V measurements

- Fourth matrix: 8 μm spacing/square corners.
- W7, W8 (0.5-1.1 kΩ·cmcm), W10, W11 (1.9 kΩ·cmcm) and W13, W14 (> 2 kΩ·cmcm) devices.
- Source current compliance 100 nA, 1 μA and 10 μA.
- Vertical lines pointing to V(Icomp), V(kmax) and V(ILDmin > 0) in each plot.



RD50-MPW2 I-V measurements: summary

	1st matrix (round 3 µm)			2nd matrix (round 8 µm)			3rd matrix (hexagonal 8 µm)			4th matrix (square 8 µm)		
	Vbd (Icomp)	Vbd (k)	Vbd (ILD)	Vbd (Icomp)	Vbd (k)	Vbd (ILD)	Vbd (Icomp)	Vbd (k)	Vbd (ILD)	Vbd (Icomp)	Vbd (k)	Vbd (ILD)
0.5-1.1 kΩ·cm	W7_1 (Icomp = 100nA)			W7_1 (Icomp = 100nA)			W7_1 (Icomp = 100nA)			W7_1 (Icomp = 100nA)		
	62 V	60 V	60 V	128 V	126 V	126 V	126 V	124 V	124 V	122 V	120 V	120 V
	W7_2 (Icomp = 100nA)			W7_2 (Icomp = 1µA)			W7_2 (Icomp = 1µA)			W7_2 (Icomp = 1µA)		
	60 V	56 V	56 V	126 V	124 V	124 V	126 V	124 V	124 V	128 V	126 V	126 V
	W7_3 (Icomp = 100nA)			W7_3 (Icomp = 1µA)			W7_3 (Icomp = 1µA)			W7_3 (Icomp = 1µA)		
	58V	54V	54V	124 V	122 V	122 V	124 V	122 V	122 V	124 V	120 V	120 V
	W7_4 (Icomp = 100nA)			W7_4 (Icomp = 10nA)			W7_4 (Icomp = 10nA)			W7_4 (Icomp = 10nA)		
	56 V	54 V	54 V	124 V	124 V	126 V	122 V	120 V	120 V	120 V	118 V	118 V
	W8_1 (Icomp = 100nA)			W8_1 (Icomp = 100nA)			W8_1 (Icomp = 100nA)			W8_1 (Icomp = 100nA)		
	56 V	54 V	54 V	116 V	114 V	114 V	116 V	114 V	114 V	114 V	114 V	114 V
	W8_2 (Icomp = 100nA)			W8_2 (Icomp = 100nA)			W8_2 (Icomp = 100nA)			W8_2 (Icomp = 100nA)		
	56 V	56 V	56 V	116 V	114 V	116 V	116 V	114 V	114 V	114 V	112 V	112 V
	W8_3 (Icomp = 100nA)			W8_3 (Icomp = 100nA)			W8_3 (Icomp = 100nA)			W8_3 (Icomp = 100nA)		
	56 V	54 V	54 V	116 V	114 V	112 V	116 V	116 V	116 V	112 V	112 V	112 V
	W8_4 (Icomp = 100nA)			W8_4 (Icomp = 100nA)			W8_4 (Icomp = 100nA)			W8_4 (Icomp = 100nA)		
	56 V	54 V	54 V	116 V	114 V	114 V	116 V	114 V	114 V	114 V	112 V	112 V

RD50-MPW2 I-V measurements: summary

	1st matrix (round 3 µm)			2nd matrix (round 8 µm)			3rd matrix (hexagonal 8 µm)			4th matrix (square 8 µm)		
1.9 kΩ·cm	W10_1 (Icomp = 100nA)			W10_1 (Icomp = 100nA)			W10_1 (Icomp = 100nA)			W10_1 (Icomp = 100nA)		
	62 V	60 V	60 V	120 V	118 V	118 V	118 V	116 V	116 V	116 V	114 V	114 V
	W10_2 (Icomp = 100nA)			W10_2 (Icomp = 10µA)			W10_2 (Icomp = 1µA)			W10_2 (Icomp = 1µA)		
	58 V	54 V	54 V	124 V	122 V	122 V	126 V	124 V	124 V	122 V	118 V	118 V
	W10_3 (Icomp = 100nA)			W10_3 (Icomp = 1µA)			W10_3 (Icomp = 1µA)			W10_3 (Icomp = 1µA)		
	58 V	54 V	54 V	124 V	122 V	122 V	120 V	118 V	118 V	118 V	116 V	116 V
	W11_1 (Icomp = 100nA)			W11_1 (Icomp = 10nA)			W11_1 (Icomp = 10nA)			W11_1 (Icomp = 10nA)		
	56 V	54 V	54 V	112 V	110 V	110 V	122 V	122 V	120 V	112 V	112 V	110 V
	W11_2 (Icomp = 100nA)			W11_2 (Icomp = 10nA)			W11_2 (Icomp = 10nA)			W11_2 (Icomp = 10nA)		
	56 V	54 V	54 V	112 V	110 V	110 V	122 V	120 V	120 V	112 V	110 V	110 V
	W11_3 (Icomp = 100nA)			W11_3 (Icomp = 10nA)			W11_3 (Icomp = 10nA)			W11_3 (Icomp = 10nA)		
	56 V	54 V	54 V	112 V	110 V	110 V	122 V	120 V	120 V	112 V	110 V	110 V
	W11_4 (Icomp = 100nA)			W11_4 (Icomp = 10nA)			W11_4 (Icomp = 10nA)			W11_4 (Icomp = 10nA)		
	56 V	54 V	54 V	110 V	108 V	108 V	116 V	114 V	114 V	116 V	114 V	114 V
>2 kΩ·cm	W13_1 (Icomp = 100nA)			W13_1 (Icomp = 100nA)			W13_1 (Icomp = 100nA)			W13_1 (Icomp = 100nA)		
	58 V	54 V	54 V	118 V	116 V	116 V	120 V	118 V	118 V	120 V	118 V	118 V
	W13_2 (Icomp = 100nA)			W13_2 (Icomp = 10µA)			W13_2 (Icomp = 10µA)			W13_2 (Icomp = 10µA)		
	56 V	54 V	54 V	124 V	122 V	122 V	122 V	120 V	120 V	120 V	118 V	118 V
	W13_3 (Icomp = 100nA)			W13_3 (Icomp = 100nA)			W13_3 (Icomp = 100nA)			W13_3 (Icomp = 100nA)		
	54 V	52 V	52 V	124 V	122 V	122 V	122 V	122 V	120 V	118 V	116 V	116 V

RD50-MPW2 I-V measurements: summary

	1st matrix (round 3 µm)			2nd matrix (round 8 µm)			3rd matrix (hexagonal 8 µm)			4th matrix (square 8 µm)		
	W13_4 (Icomp = 100nA)			W13_4 (Icomp = 10nA)			W13_4 (Icomp = 10nA)			W13_4 (Icomp = 10nA)		
	54 V	52 V	52 V	116 V	114 V	114 V	116 V	114 V	114 V	116 V	114 V	114 V
	W14_1 (Icomp = 100nA)			W14_1(Icomp = 10nA)			W14_1 (Icomp = 10nA)			W14_1 (Icomp = 10nA)		
	56 V	54 V	54 V	116 V	114 V	114 V	122 V	120 V	118 V	110 V	108 V	108 V
	W14_2 (Icomp = 100nA)			W14_2 (Icomp = 10nA)			W14_2 (Icomp = 10nA)			W14_2 (Icomp = 10nA)		
	54 V	54 V	56 V	122 V	120 V	120 V	122 V	120 V	120 V	108 V	108 V	106 V
	W14_3 (Icomp = 100nA)			W14_3 (Icomp = 10nA)			W14_3 (Icomp = 10nA)			W14_3 (Icomp = 10nA)		
	52 V	52 V	54 V	116 V	114 V	114 V	122 V	120 V	120 V	110 V	108 V	108 V
	W14_4 (Icomp = 100nA)			W14_4 (Icomp = 10nA)			W14_4 (Icomp = 10nA)			W14_4 (Icomp = 10nA)		
	54 V	54 V	56 V	120 V	118 V	118 V	120 V	122 V	118 V	110 V	108 V	108 V

Next Steps

- C-V measurements of different test matrices of MPW2 for three resistivities.
- I-V measurements of the irradiated test matrices.