Update on the sensor test etc.

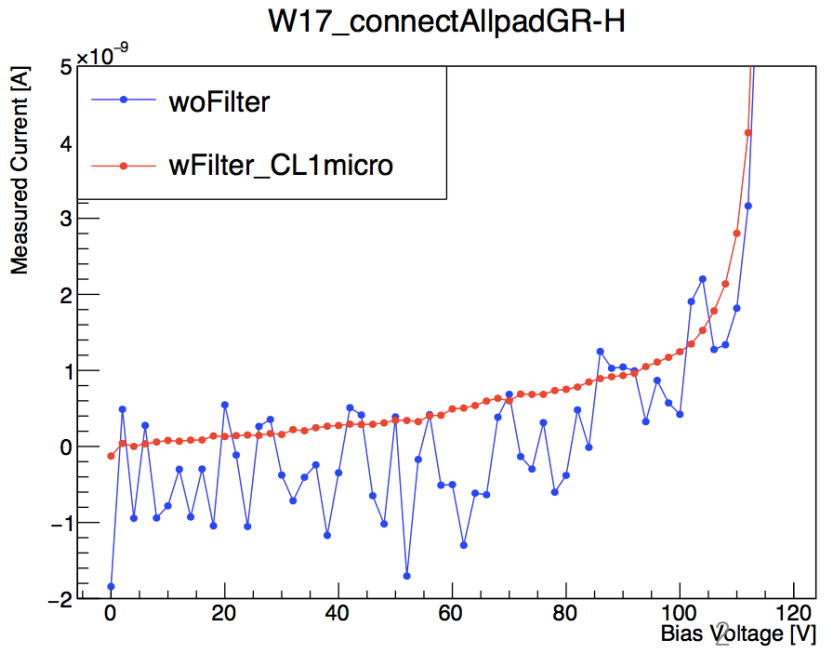
03/07/2019

From the slide @ last HGTD meeting

IV measurement settings

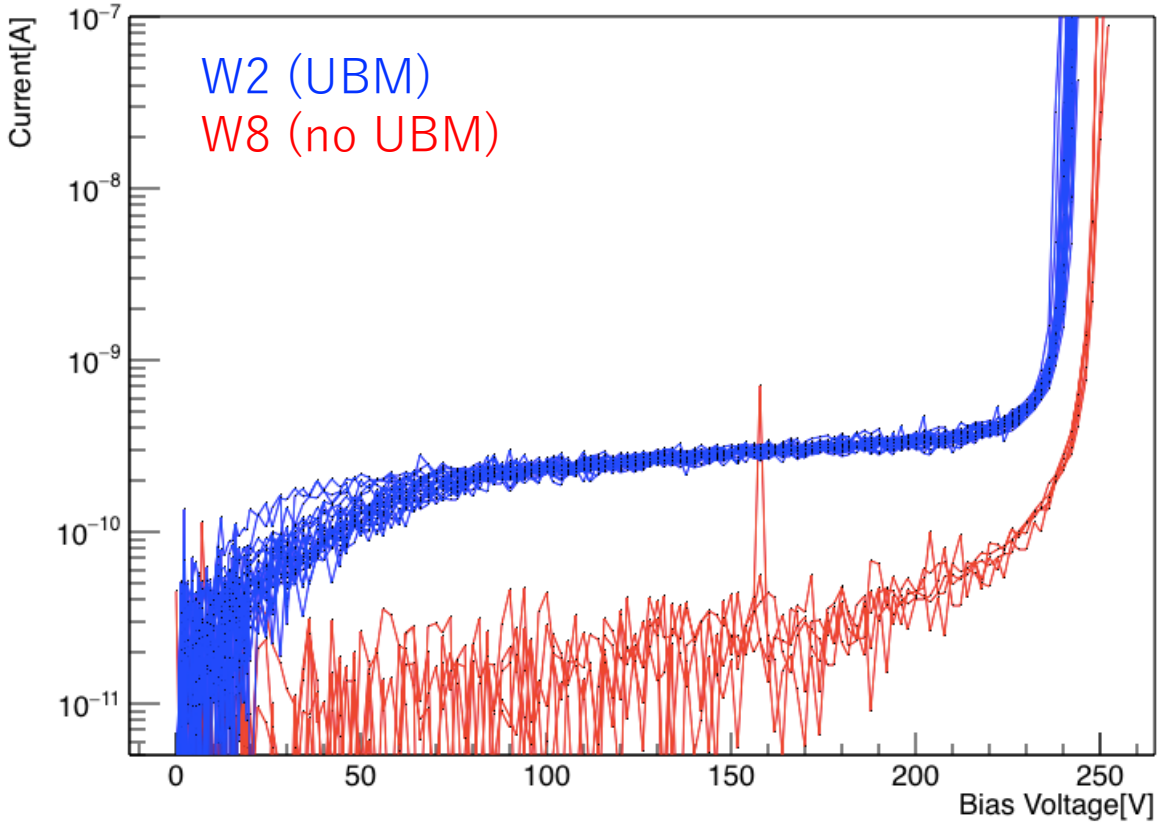
- Measurements done with all pads and the guard ring (GR) connected.
  - 24 neighbor pads and GR are connected to ground.
  - Keithley 2410 provides HV applied to the back of the sensor.
  - Keithley 2400 measures the pad current.
    - Current compliance and limit: 1μA
    - Filter enabled.

Much improved resolution with the new settings →

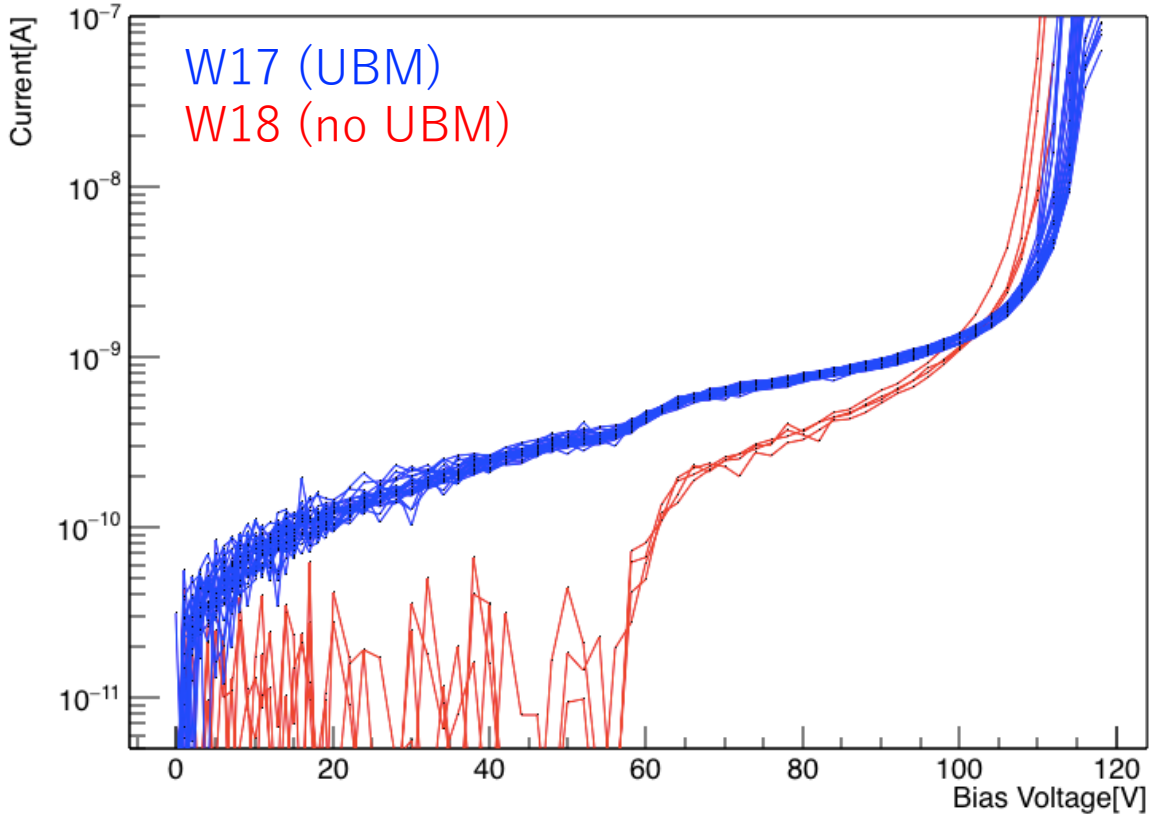


HPK 5x5 sensors : comparison with and w/o UBM

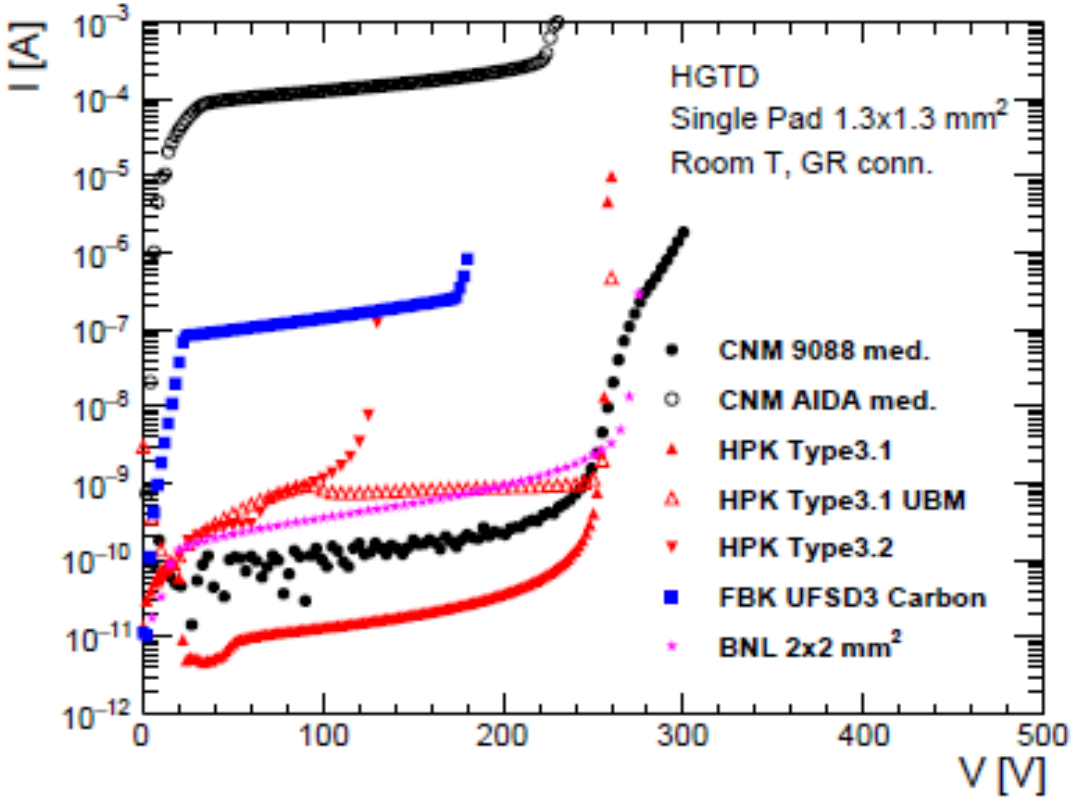
Type 3.1



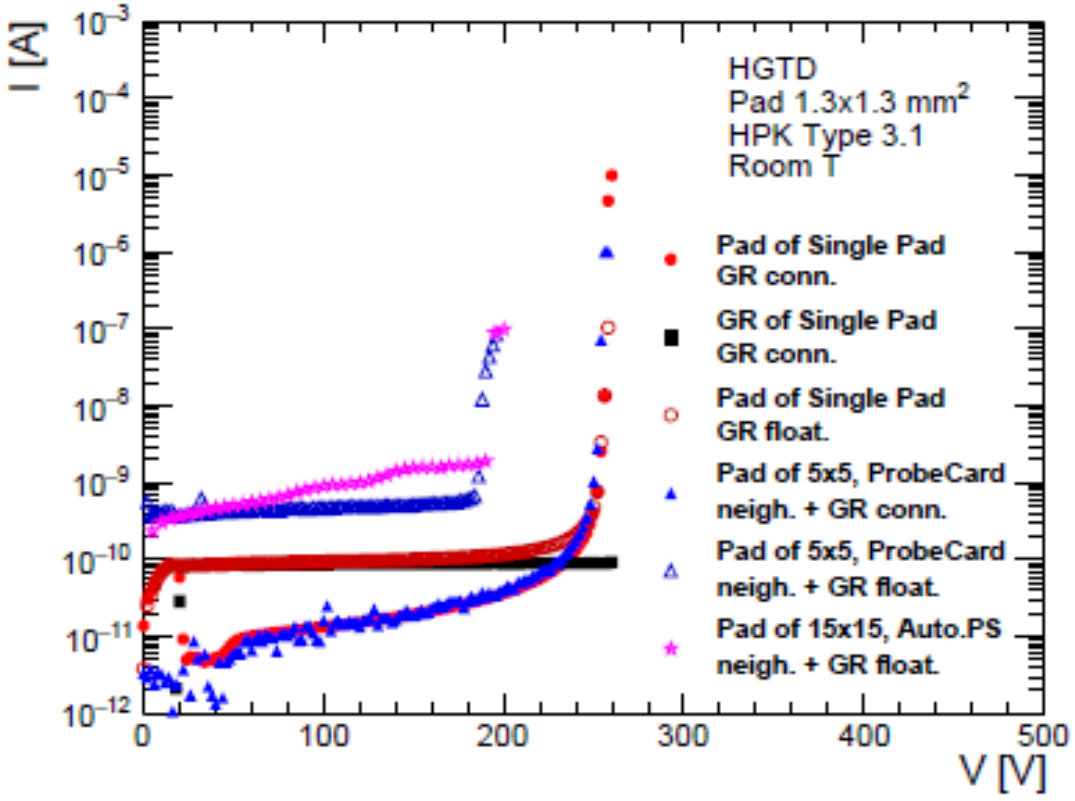
Type 3.2



Reference : Figure 5.4, TDR (pre. ver.)



(a) I-V for different runs.



(c) I-V for different types and conditions.

Our result looks similar to those. (Type3.2 UBM is not shown)

Order of 10^{-12} (pA) would be needed for Type3.1 to see structures

Array test table : (final call just before this meeting ...)

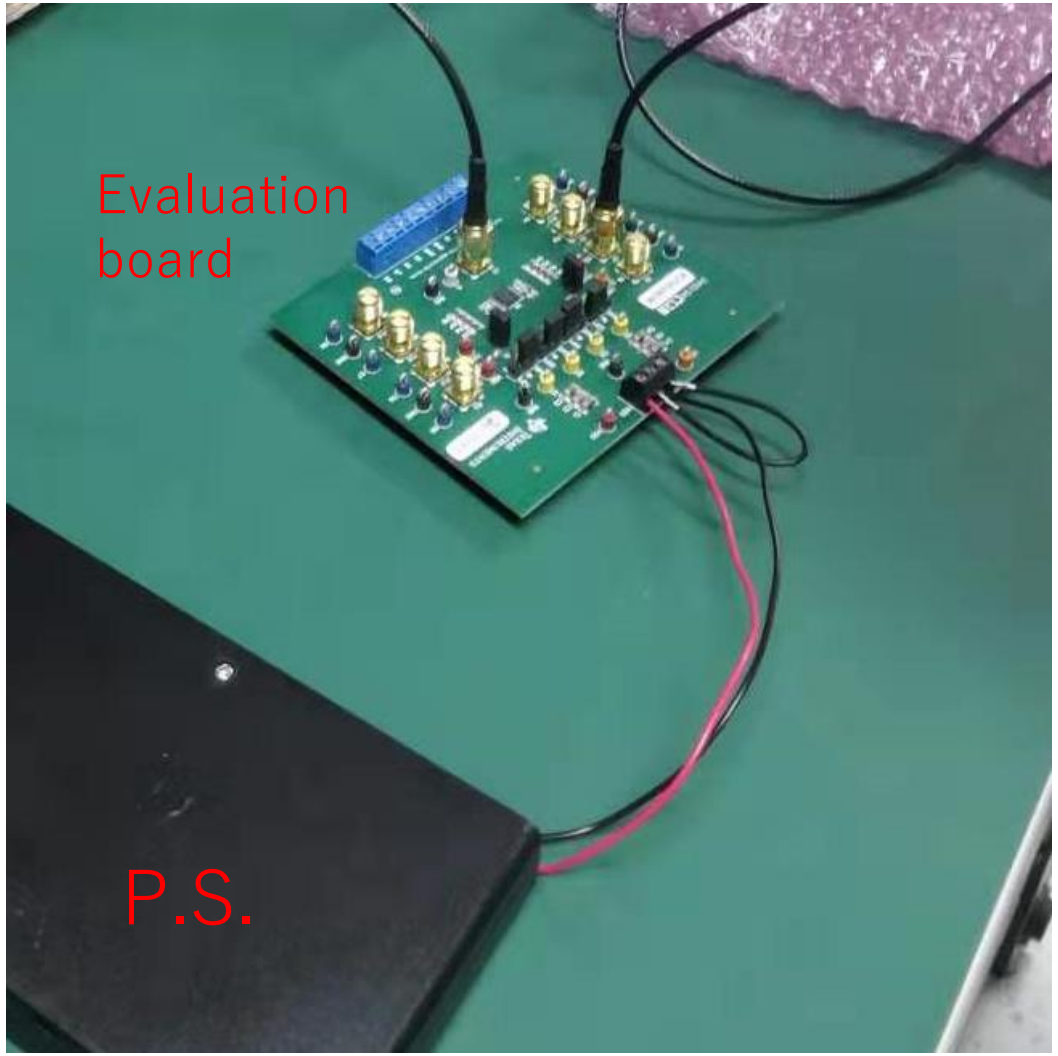
	Type 3.1							Type 3.2						
	Sensor Type	Sensors tested	Pads tested	Number of Perfect Sensors	Number of Good Pads	Fraction of Perfect Sensors [%]	Fraction of Good Pads [%]	Sensor Type	Sensors tested	Pads tested	Number of Perfect Sensors	Number of Good Pads	Fraction of Perfect Sensors [%]	Fraction of Good Pads [%]
	Single (based on HPK probing)	648	648	648	648	100	100	Single (based on HPK probing)	216	216	216	216	100	100
	Single SE5	360	360	360	360	100	100	Single SE5	120	120	120	120	100	100
	Single SE5	144	144	144	144	100	100	Single SE5	48	48	48	48	100	100
	Single SE5	144	144	144	144	100	100	Single SE5	48	48	48	48	100	100
	5x5 All groups	17	425	17	425	100	100	5x5 All groups	5	125	5	125	100	100
	15x15 All groups	8	1800	7	1799	87.5	99.94444444	15x15 All groups	3	675	2	673	66.66666667	99.7037037
	Göttingen:							**Göttingen:**						
	5x5	6	150	6	150	100	100	5x5	1	25	1	25	100	100
	15x15	7	1575	6	1574	85.71428571	99.93650794	15x15	3	675	2	673	66.66666667	99.7037037
	UCSC:							**UCSC:**						
	5x5	10	250	10	250	100	100	5x5	2	50	2	50	100	100
	15x15	1	225	1	225	0	1	15x15	0	0				
	IHEP:							**IHEP:**						
	5x5	1	25	1	25	100	100	5x5	2	50	2	50	100	100
	15x15							15x15						
	BNL:							**BNL:**						
	5x5							5x5						
	15x15							15x15						
	JSI:							**JSI:**						
	5x5							5x5						
	15x15							15x15						

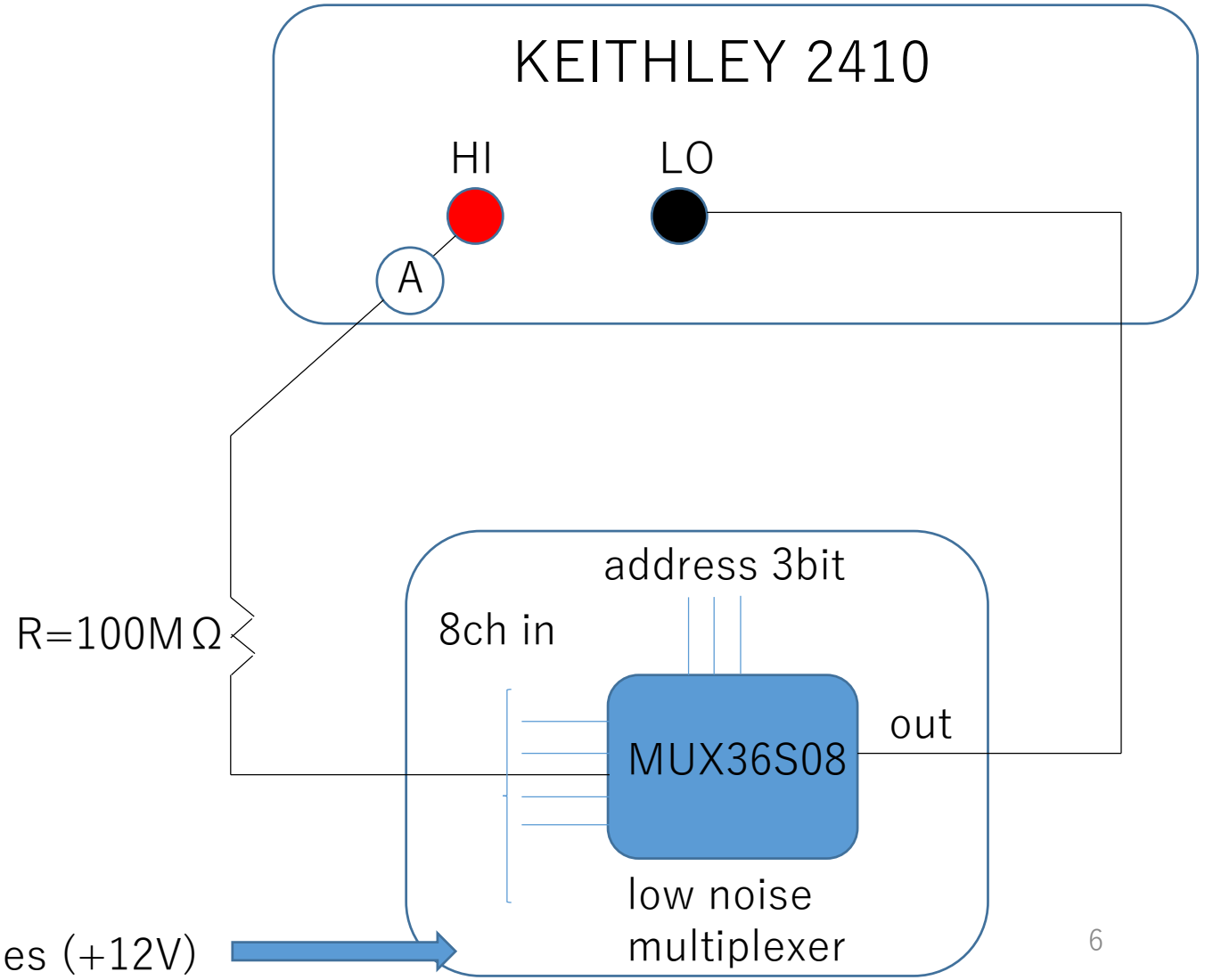
+ 2 Type3.1 sensors (Wo.1/Wo.2)

+ 1 Type3.2 sensors (Wo.17)

https://docs.google.com/spreadsheets/d/1UVbaEZUe-IUIA5GMC6wOkC8FcSucVARpMG_GrKsyeWs/edit#gid=1569817068

Test of the MUX evaluation board





Power Supply (P.S.) : Now with batteries (+12V)

Test of the MUX evaluation board

・ Current fluctuation was O(10)pA (including precision of SMU itself)

→ As expected from spec. sheet

・ Address is controlled with shunts, therefore, the current fluctuation by using digital level from Raspberry Pi is the next issue. (personally, expecting the necessity of isolators)

Fig : 1V/1MΩ = 0.01 μA with fluctuation

Technical document on MUX36xxx (Texas Inst.)

			T_A = –40°C to +125°C			58	
	On-resistance drift	V_S = 0 V			0.62		Ω/°C
$I_{S(OFF)}$	Input leakage current	Switch state is off, V_S = ±10 V, V_D = ±10 V[1]		–0.04	0.001	0.04	nA
			T_A = –40°C to +85°C	–0.15		0.15	
			T_A = –40°C to +125°C	–1.2		1.2	
	Output off leakage	Switch state is off,		–0.15	0.01	0.15	

Next

(from my side)

- Setup Raspberry PI

- IV on 5x5 arrays with KEITHLEY 6487
  (depending on the schedule)