INTT Sensor Test Result Check

NCU

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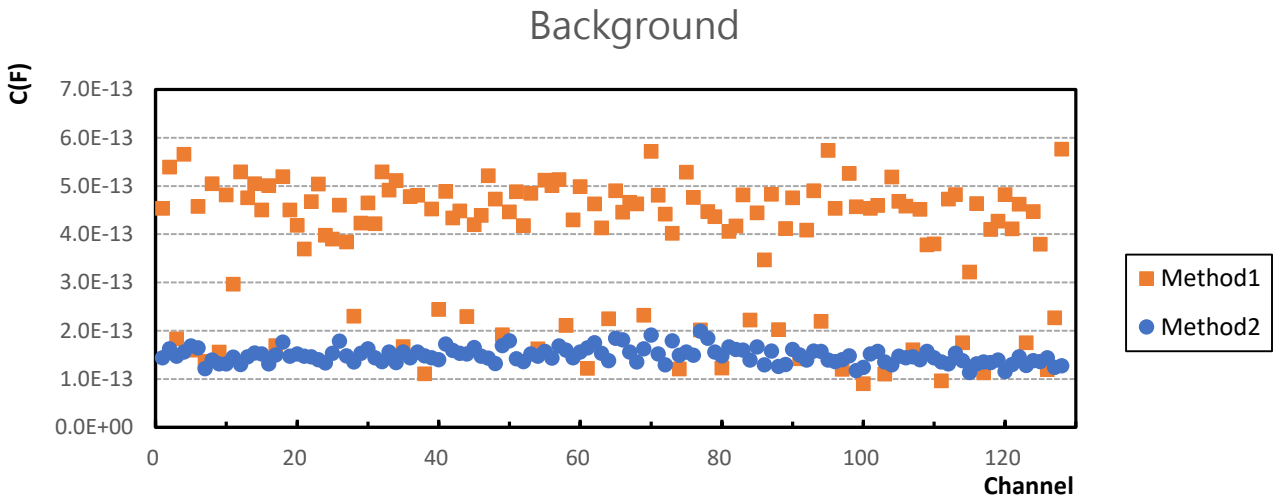
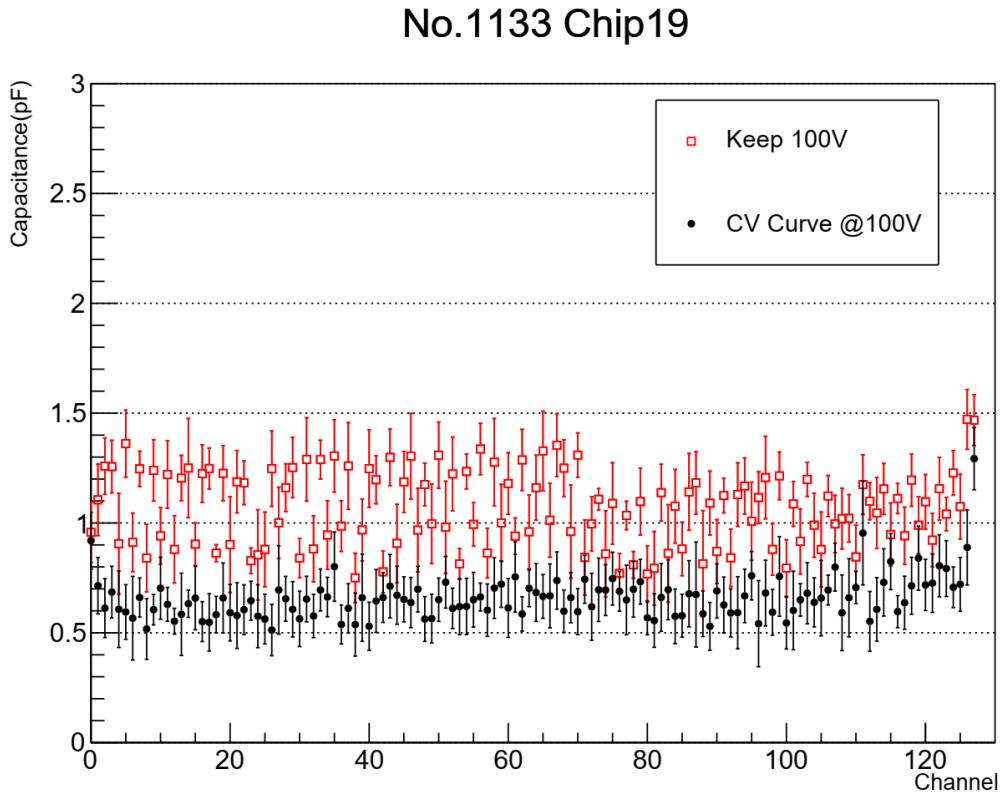
Reason of Method Test

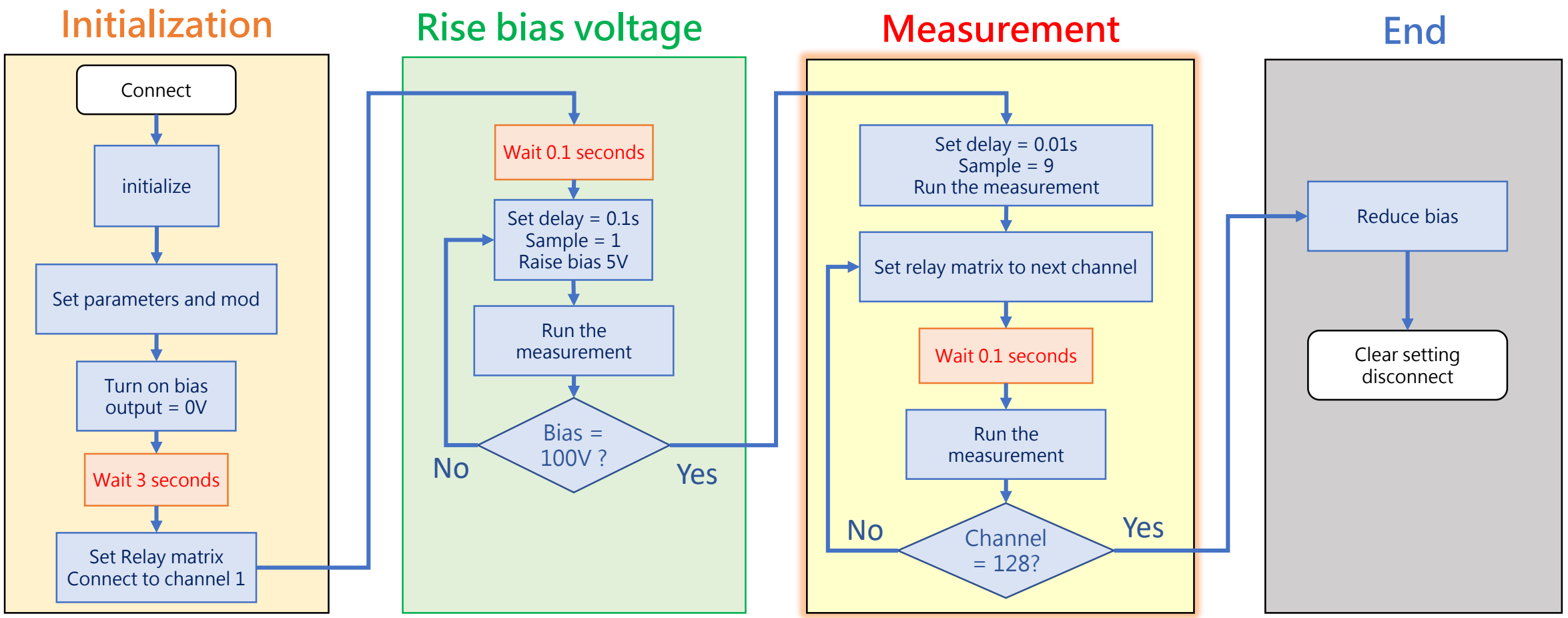
- From the early study, I said the background didn't have problem. They didn't have oblivious gap. However, during the background check in the beginning of testing I found the value background became larger and more unstable (Method 1).
- If some channels didn't connect stable, I re-measured these channels with CV curve to check state. However, the capacitances form the CV curve are lower than keep 100V to measurement, so the re-measurement value will lower than other measurement. It will increase measuring time or complexity of definition rank.
- For solve this problem, I test the more parameters and go back to check the process of program to identify the reason. Finally, seems I success to reduce fluctuation, but I still doesn't know the reason.





Process of Program

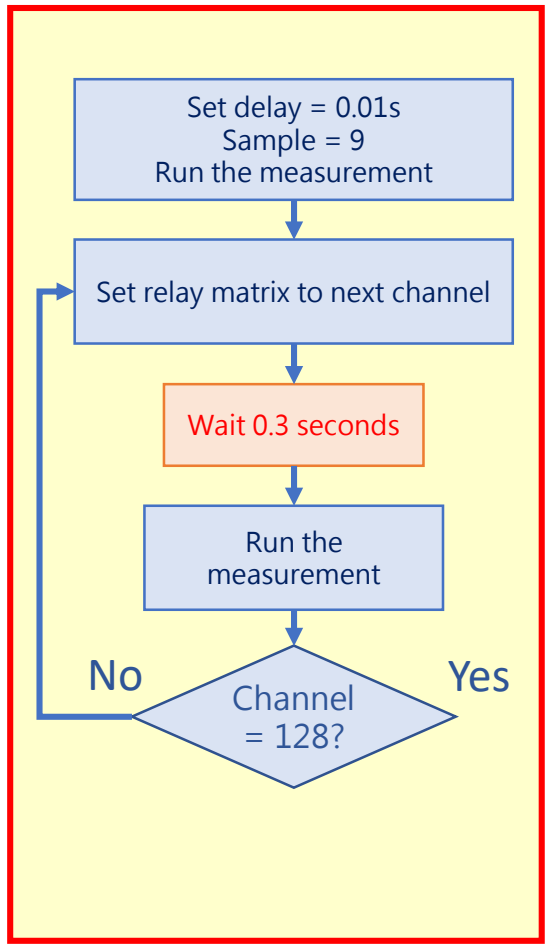
- The bias voltage and AC test signal are come from different models (same instrument but different model).



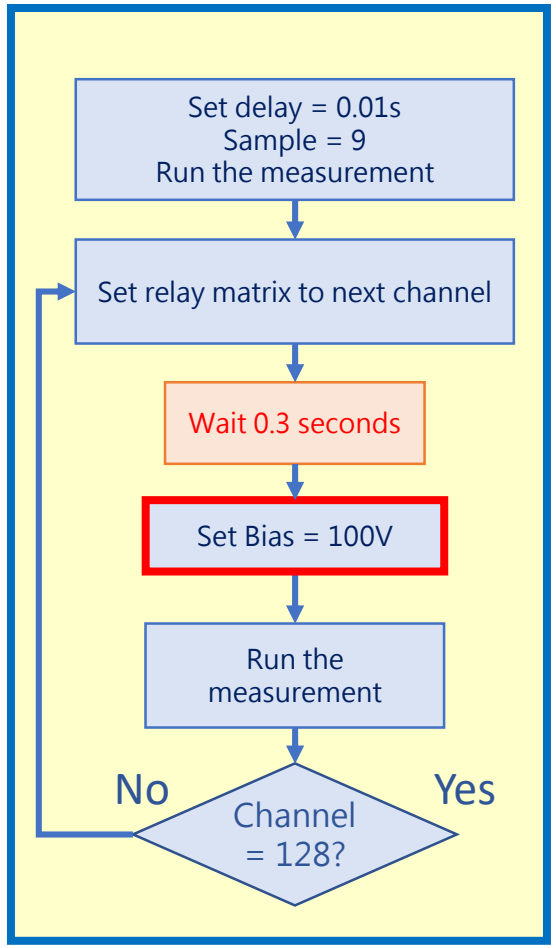
Measurement Process Test

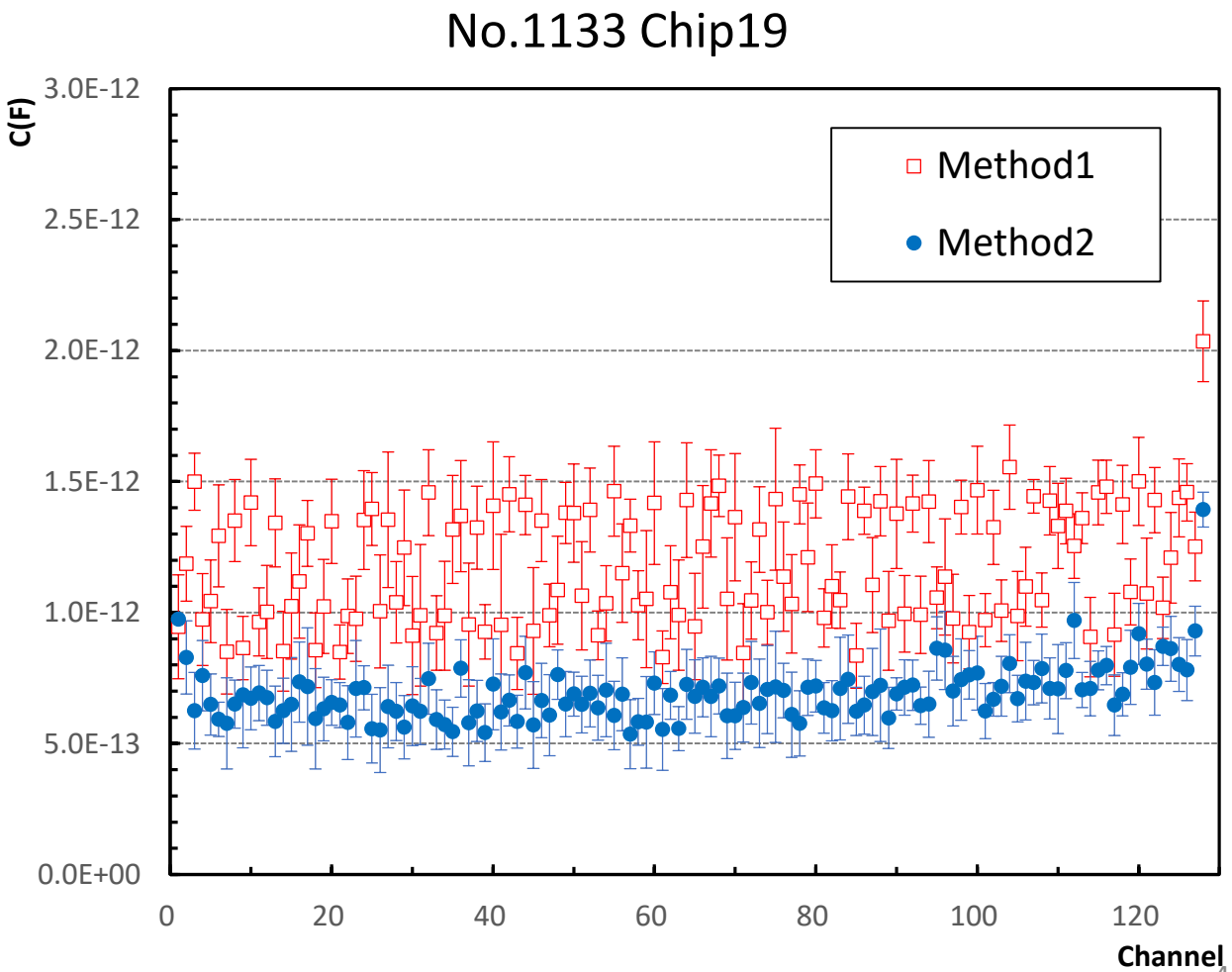
- Because result of CV curve and integral time test didn't change, I try to add one extra step between measurement to test.
- After step of bias rise, the voltage always keep at 100V, but in method 2 I set again the bias from 100V to 100V before the measurement.

Method 1 (initial)



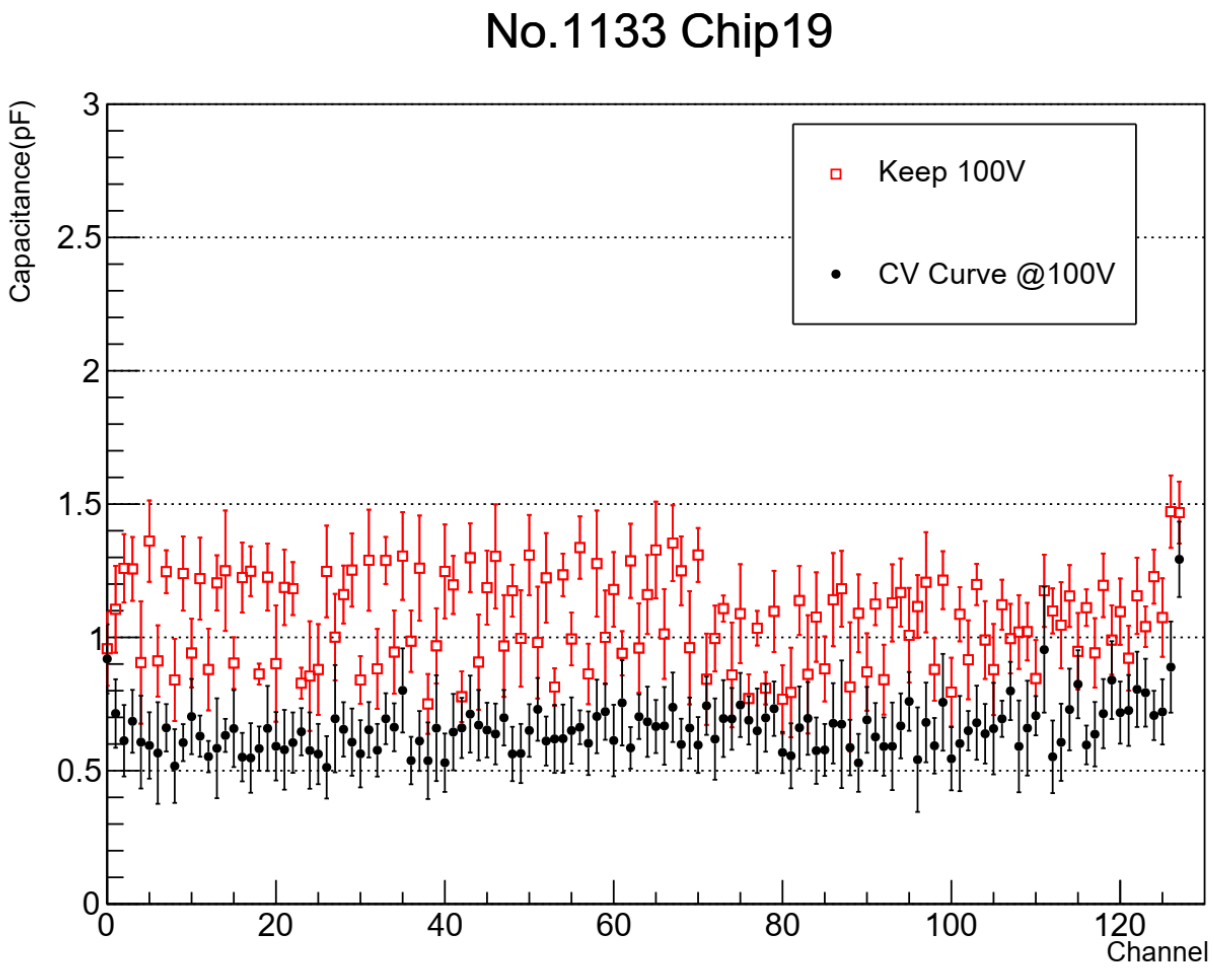
Method 2

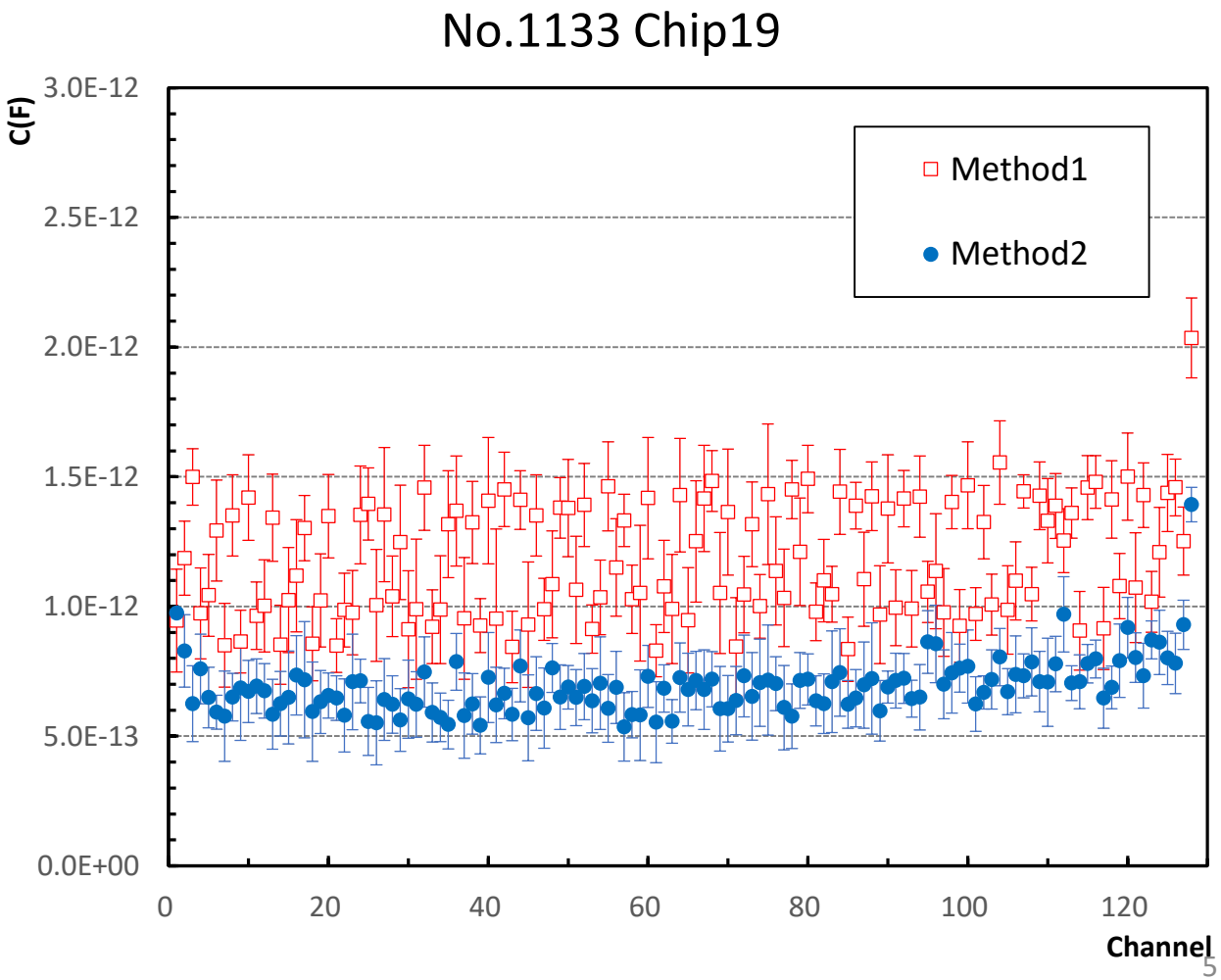




Compare the Result of CV Curve and Method 2

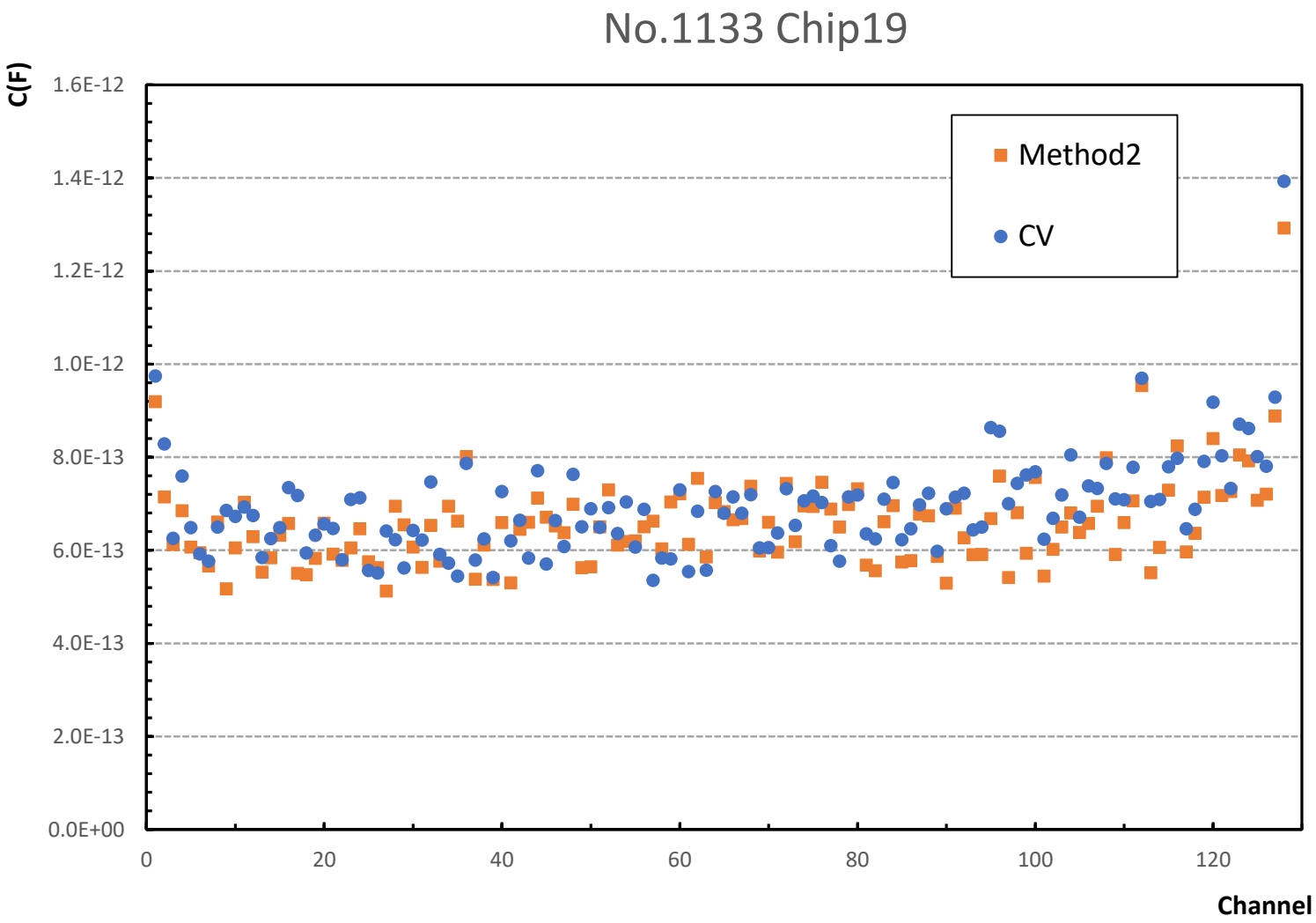
- After re-set the bias before measurement, the behavior is similar to CV curve.
- Compare with method 1 the capacitance is closer to CV curve and the fluctuation is smaller.





Compare the Result of CV Curve and Method 2

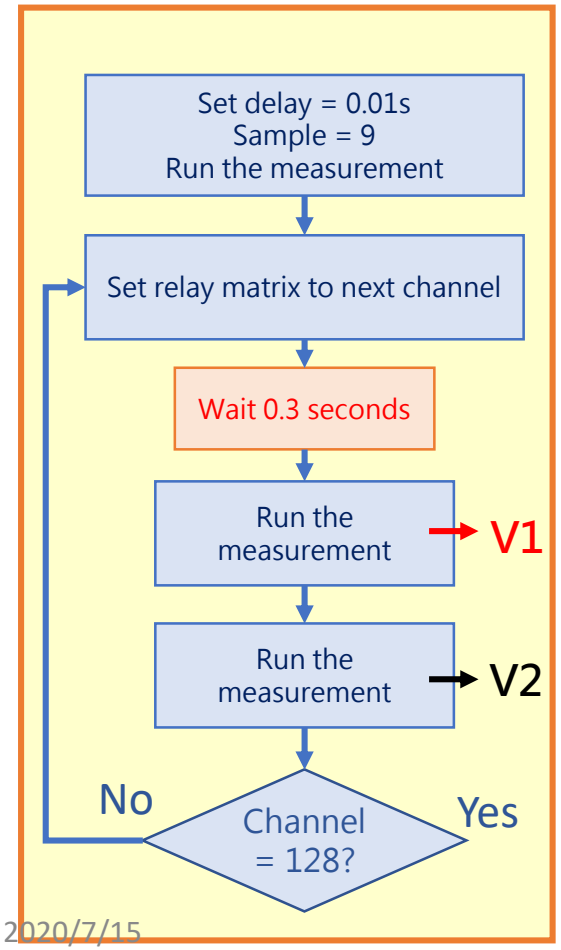
- The result of method 2 and CV are the same.



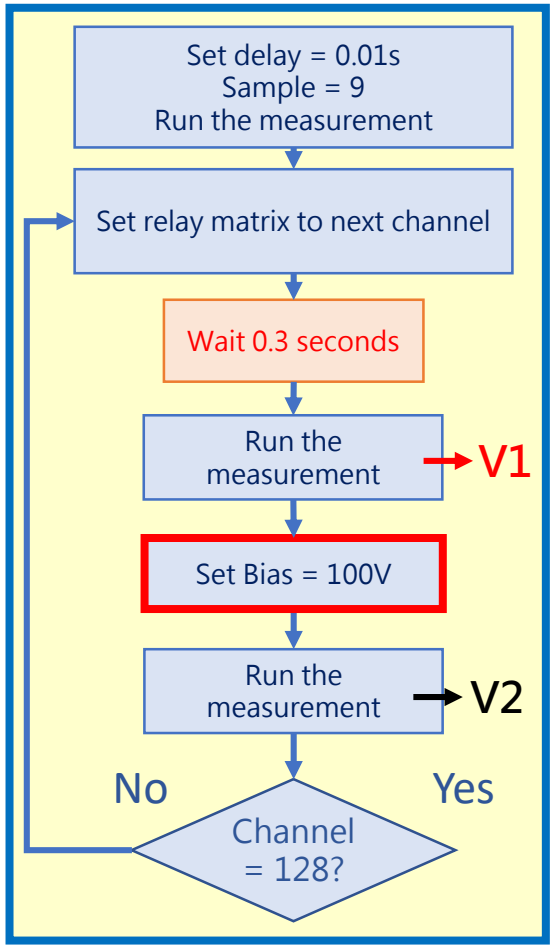
Bias Output Check

- The flotation always smaller (<0.2mV) in both methods. Comparing with test signal (30mV) the flotation can be ignored.

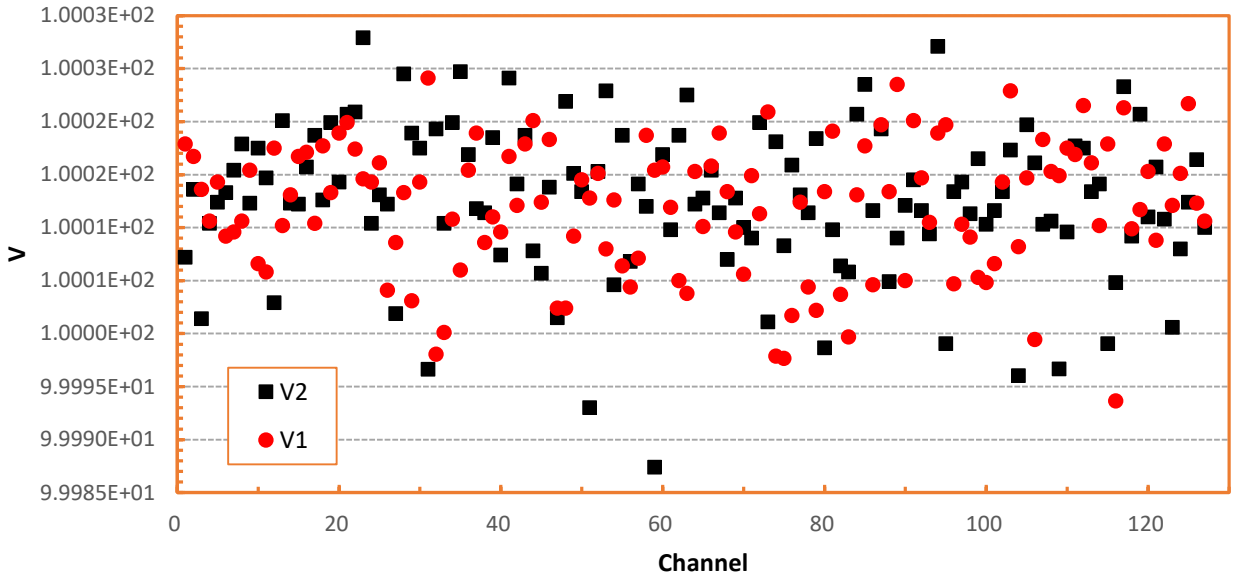
Method 1 (initial)



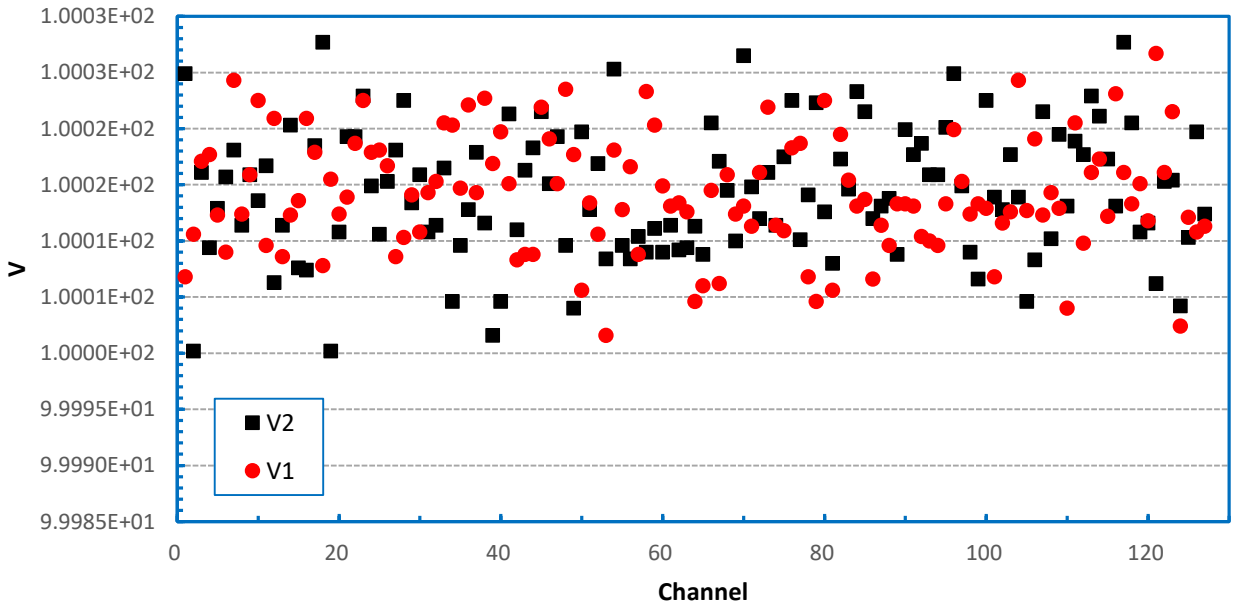
Method 2



Method 1

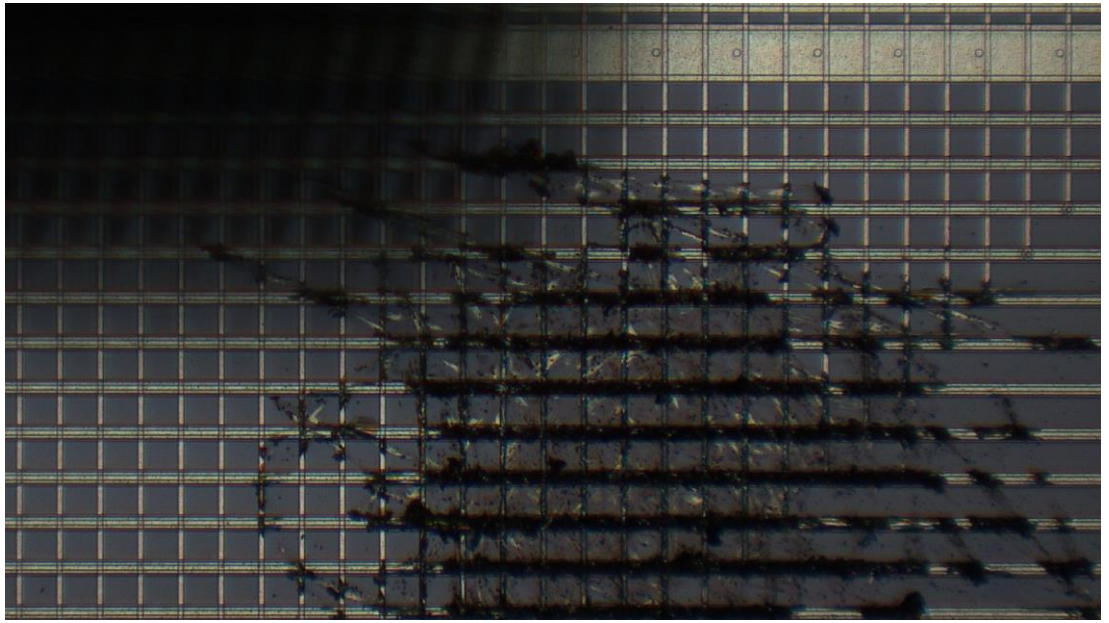


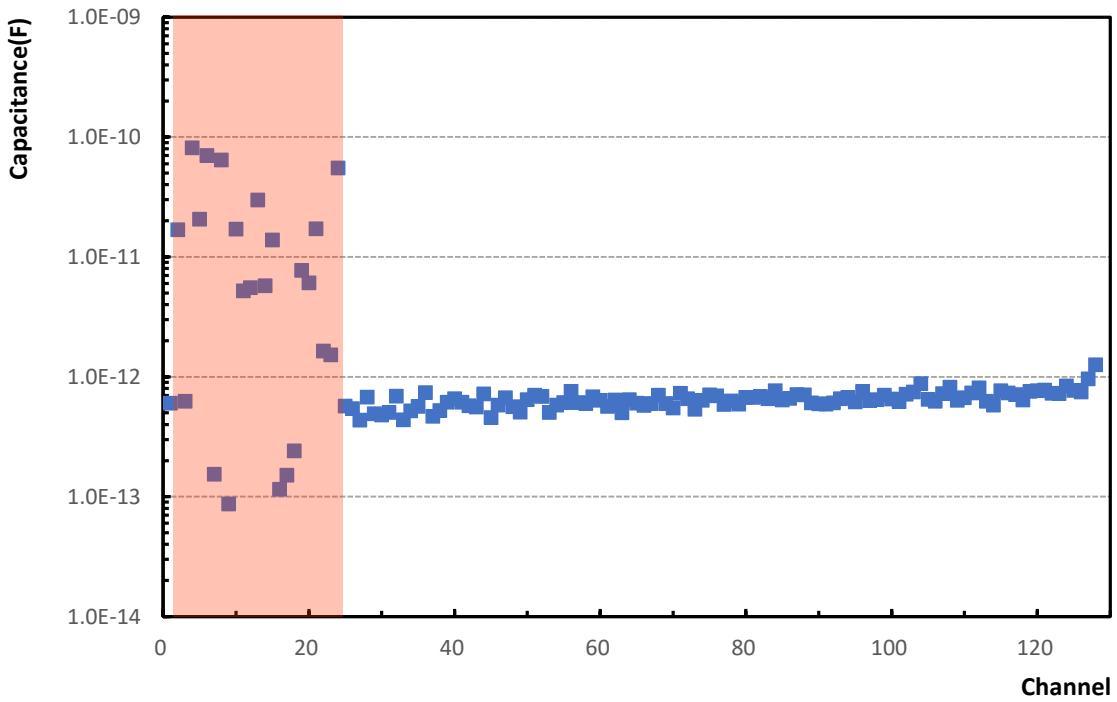
Method 2



Broken Sensor Test

- Using the knife to break surface of bad sensor. (show in the top photo)
- I can't control and sure what kind of damage that I made, but **we can easy identify the bad channels from the measurement.**
- Almost broken channels has higher capacitance. It is maybe caused by I broke the oxide to short to PN junction or parallel with other capacitor?
- The smaller value is close to floating value.





Summary

- Re-set the bias before measurement could get better result, but still doesn't know the reason after discuss with engineer of keithley. From the bias output check, I think the voltage didn't have large fluctuation.
- Anyway, this change can improve the measurement, so I will use this method to keep sensor testing.
- First, done the measurement of new sensors. When there are enough data to build distribution, it can help we to decide the rule to define the state of each channel. If we still have time, re-measure previous sensor to upgrade data.
- The probe card of IV measurement also done, so also can start the IV testing after CV testing.
- The broken channels can be defined easy from testing.

The State of testing

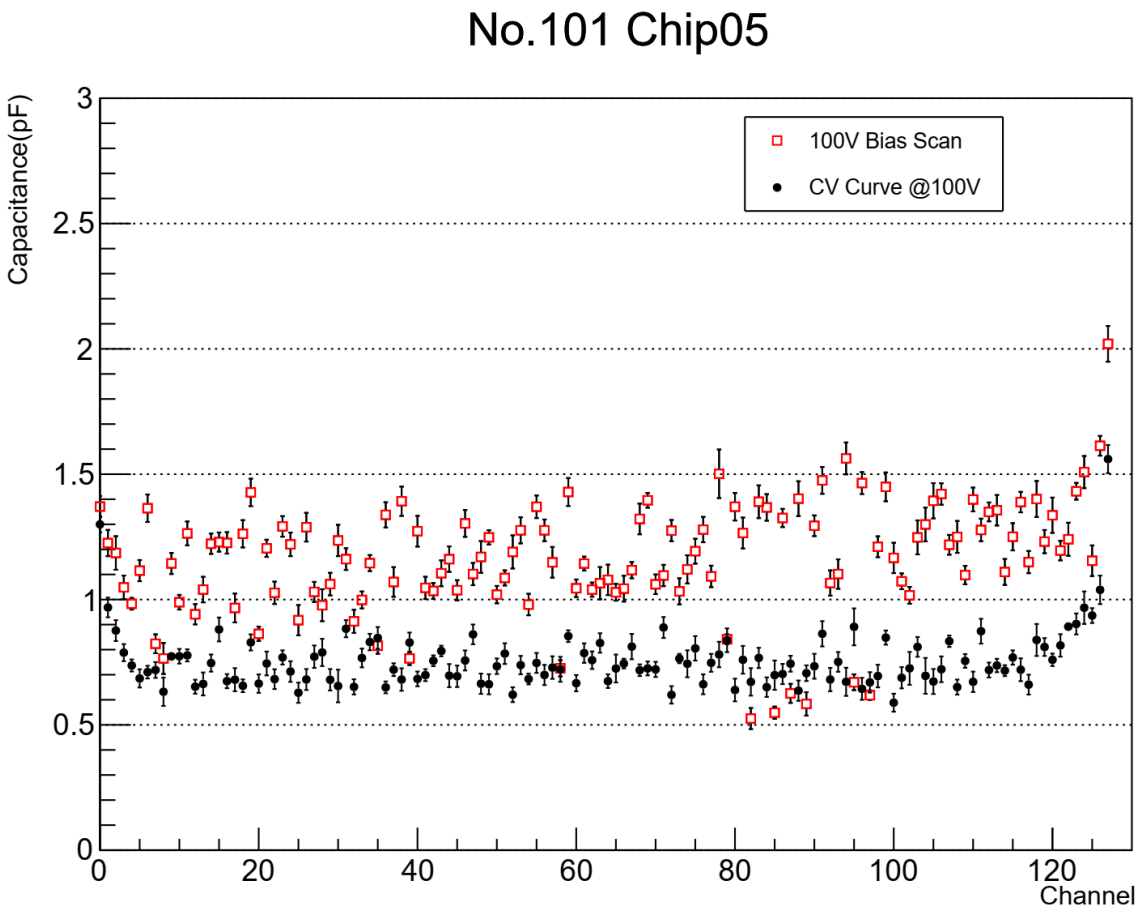
Serial No. TypeA	TypeA-I Done?	TypeA-II Done?	Serial No. TypeB	TypeB-I Done?	TypeB-II Done?
1131	☑	☑	1131	☑	☑
1132	☑	☑	1132	☑	☑
1133	☑	☐	1133	☐	☐
1134	☑	☑	1134	☐	☐
1135	☑	☑	1135	☐	☐
1136	☑	☑	1136	☐	☐
1137	☑	☑	1137	☐	☐
1138	☑	☑	1138	☐	☐
1139	☑	☑	1139	☐	☐
1140	☑	☑	1140	☐	☐
1141	☑	☑	1141	☐	☐
1142	☑	☑	1142	☐	☐
1143	☑	☑	1143	☐	☐
1144	☑	☐	1144	☐	☐
1145	☑	☐	1145	☐	☐
1146	☑	☐	1146	☐	☐
1147	☑	☐	1147	☐	☐
1148	☑	☐	1148	☐	☐
1149	☑	☐	1149	☐	☐
1150	☐	☐	1150	☐	☐
1151	☐	☐	1151	☐	☐
1152	☐	☐	1152	☐	☐
1153	☐	☐	1153	☐	☐
1154	☐	☐	1154	☐	☐
1155	☐	☐	1155	☐	☐
1156	☐	☐	1156	☐	☐
1157	☐	☐	1157	☐	☐
1158	☐	☐	1158	☐	☐
1159	☐	☐	1159	☐	☐

Back up

Measure Capacitance with different methods

- During measure type B sensor, I found when I measure CV curve on single channel, the capacitance is obviously lower than keep 100V to scan each channel. Therefore, I measure the CV curve of all channels and compare with bias scan value.
- Each measurement point in CV or bias scan are measured 9 times to calculate average and rms.

	Parameters	Bias Scan	CV
Raise voltage	step	5V	5V
	delay	0.1s	0.01s
	sample	1	9
	Raise in	Channel 1	Each channel
Switch channel	delay	0.3s	0.3s
Measure at 100V	delay	0.01s	0.01s
	sample	9	9



Measure Capacitance with different methods

- The capacitances from CV method are lower than values from scan method, but It still can be divided from broken or short channels.

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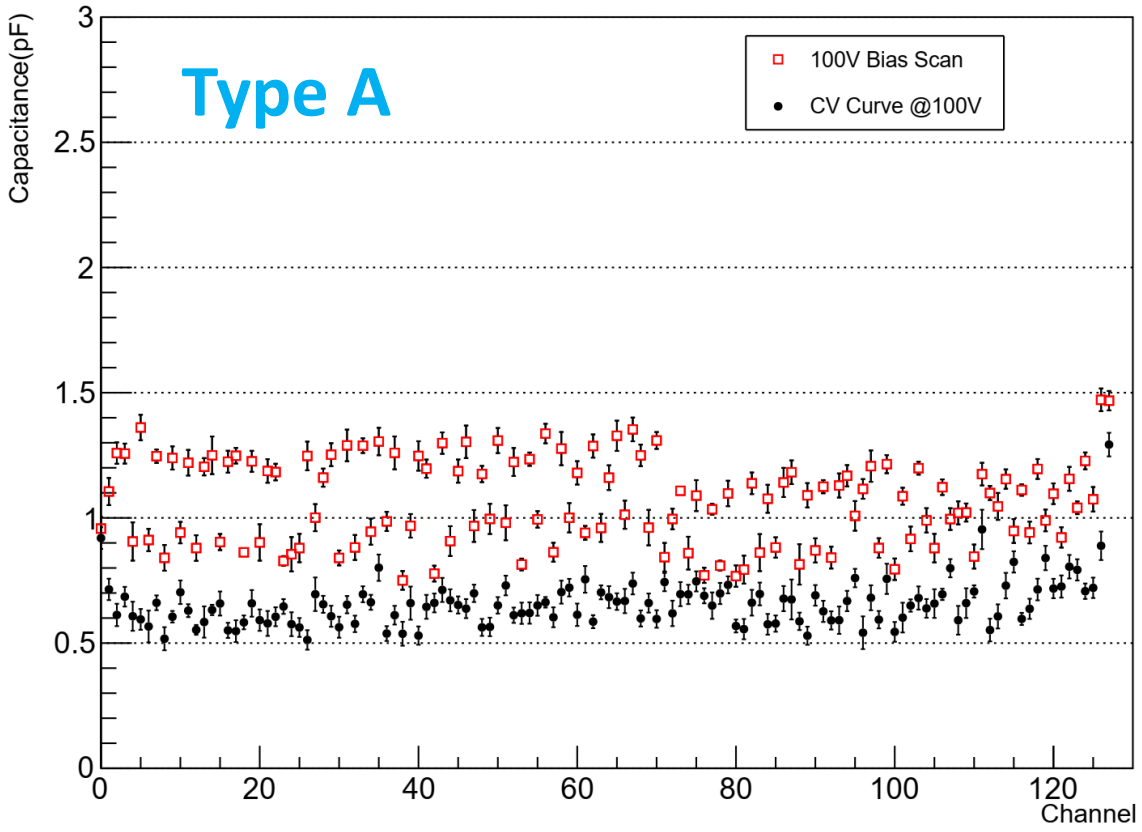

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