INTT Sensor Test Report

NCU

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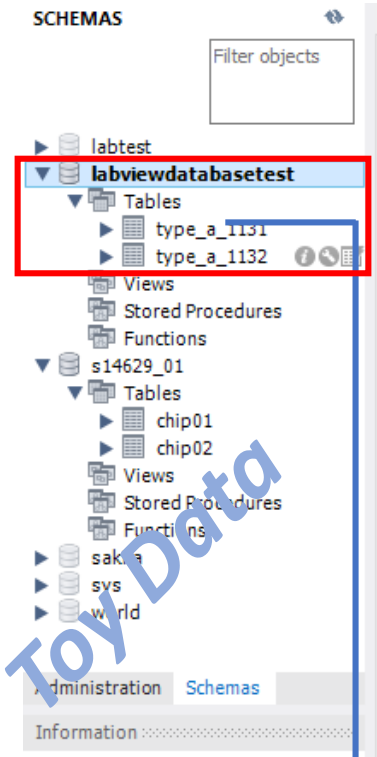
List

- The structure of database
- The trace test and probe card test (measurement system test)
- Check the situation of new sensors (arrival on 4/17) by microscope

Database Structure

- I used the mySQL to make the localhost database and wrote the data by labview program.
- I write the data by two different structures
    1. One database records the result of all sensors in one shipment. (p4. - p.5)
    2. One database records the result of one sensor. (p6. - p.7)
- Do you think which one is better?
- I list all items that I think should be recorded in database. Does anything I leave out?



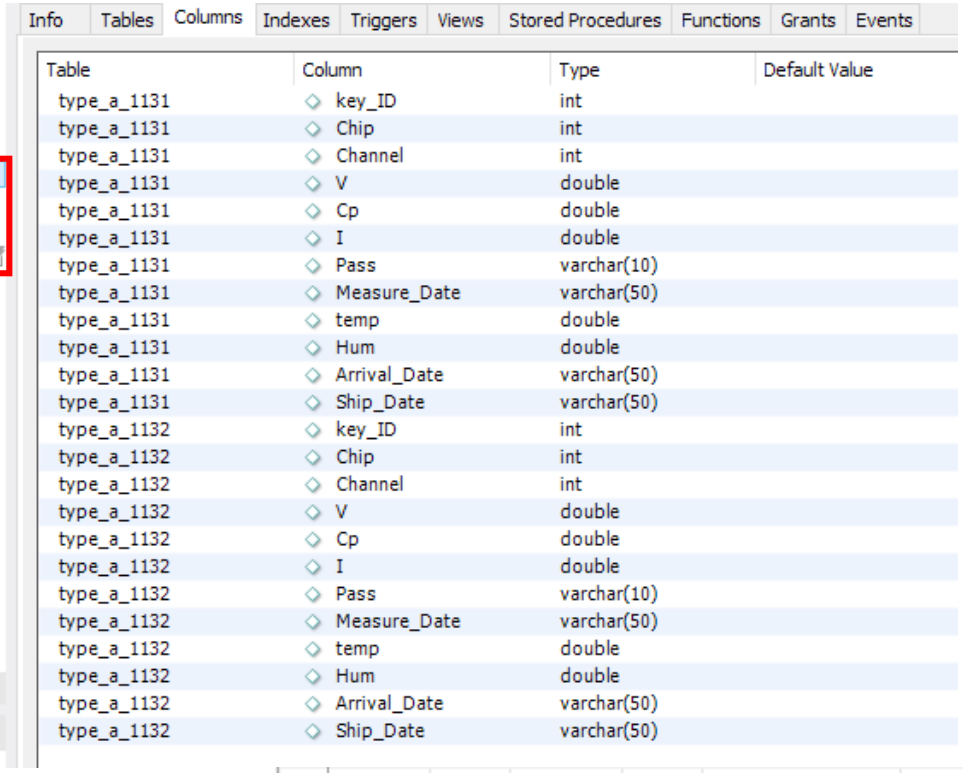


Table	Column	Type	Default Value
type_a_1131	key_ID	int	
type_a_1131	Chip	int	
type_a_1131	Channel	int	
type_a_1131	V	double	
type_a_1131	Cp	double	
type_a_1131	I	double	
type_a_1131	Pass	varchar(10)	
type_a_1131	Measure_Date	varchar(50)	
type_a_1131	temp	double	
type_a_1131	Hum	double	
type_a_1131	Arrival_Date	varchar(50)	
type_a_1131	Ship_Date	varchar(50)	
type_a_1132	key_ID	int	
type_a_1132	Chip	int	
type_a_1132	Channel	int	
type_a_1132	V	double	
type_a_1132	Cp	double	
type_a_1132	I	double	
type_a_1132	Pass	varchar(10)	
type_a_1132	Measure_Date	varchar(50)	
type_a_1132	temp	double	
type_a_1132	Hum	double	
type_a_1132	Arrival_Date	varchar(50)	
type_a_1132	Ship_Date	varchar(50)	

DataBase 1:

Save multi-sensor in one database

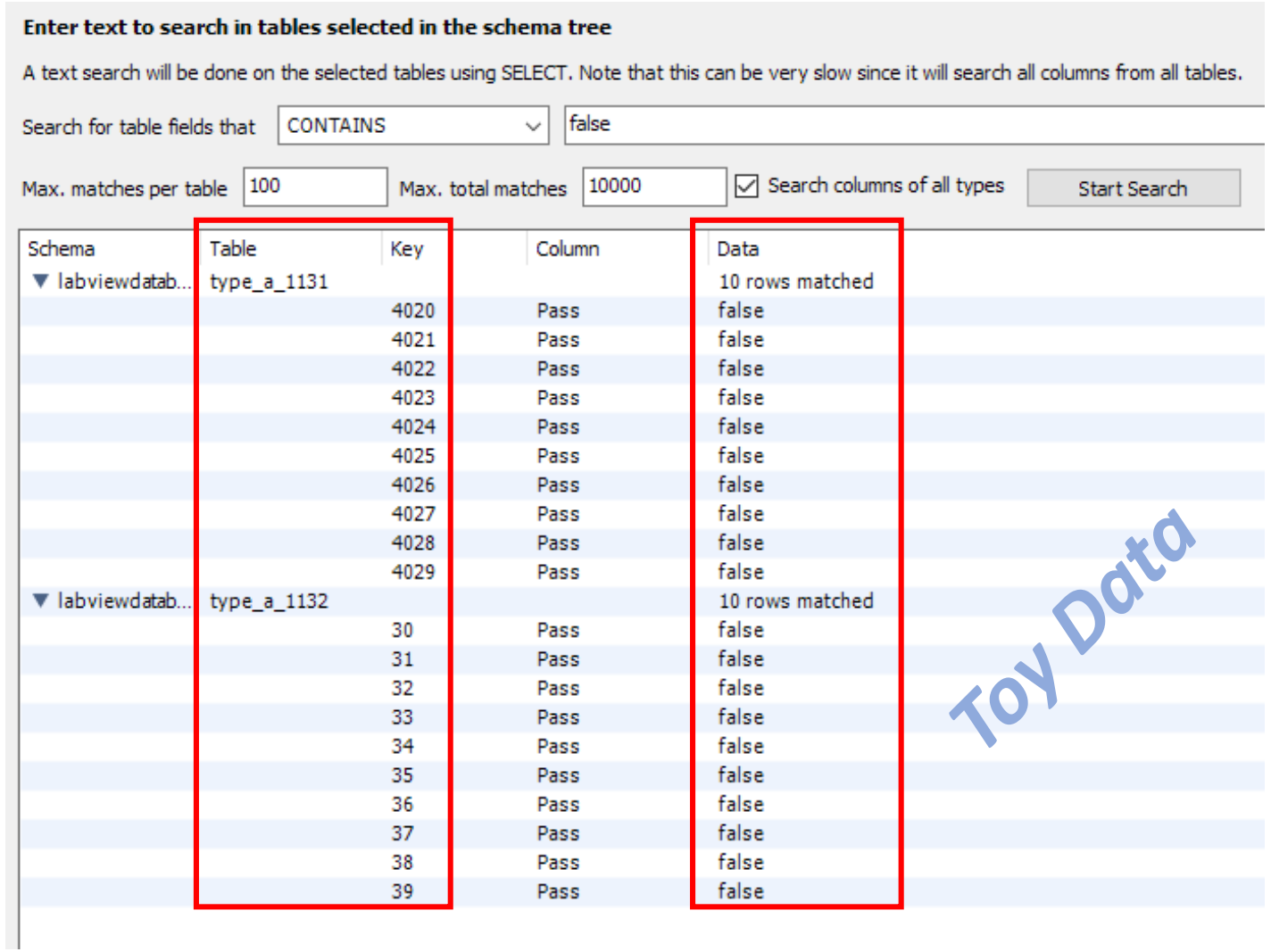
- Schemas : Shipment_number
  - Tables : Sensor_ID
    - Columns : key_ID
      Chip
      Channel
      V
      Cp
      I (if we test IV from DC pads)
      Frequency
      Pass (channel is good or not)
      Measure Date
      Temperature
      Humidity
      Arrival Date
      Ship Date
      …

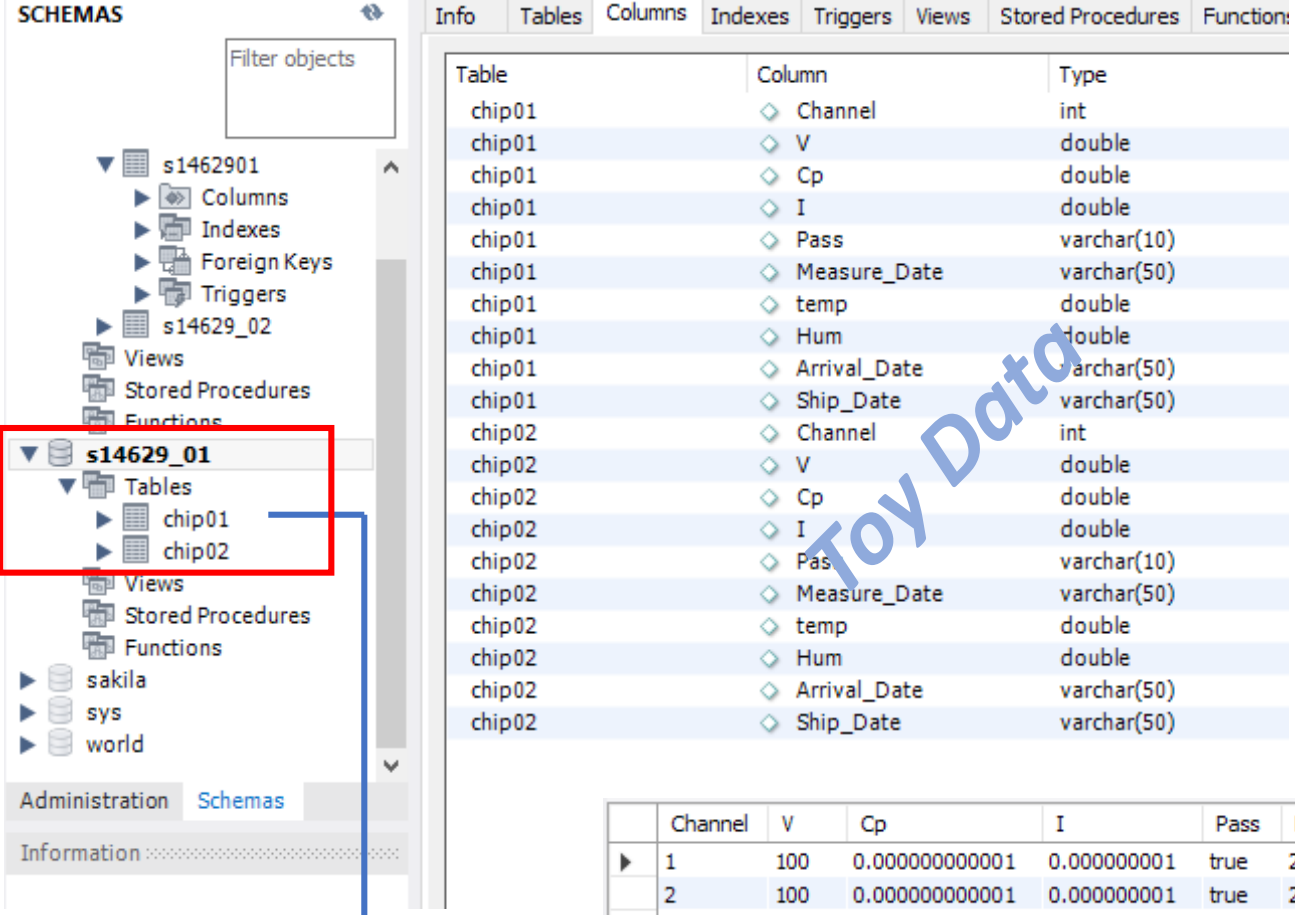
Primary key :
key_ID = chip*1000 + channel

key_ID	Chip	Channel	V	Cp	I	Pass	Measure_Date	temp	Hum	Arriva
55	0	55	100	0.000000000001	0.000000001	true	2020/4/17	25	55	
56	0	56	100	0.000000000001	0.000000001	true	2020/4/17	25	55	
57	0	57	100	0.000000000001	0.000000001	true	2020/4/17	25	55	
58	0	58	100	0.000000000001	0.000000001	true	2020/4/17	25	55	
59	0	59	100	0.000000000001	0.000000001	true	2020/4/17	25	55	
3001	3	1	100	0.000000000001	0.000000001	true	2020/4/17	21.3	0	
3002	3	2	100	0.000000000001	0.000000001	true	2020/4/17	21.3	0	
3003	3	3	100	0.000000000001	0.000000001	true	2020/4/17	21.3	0	
3004	3	4	100	0.000000000001	0.000000001	true	2020/4/17	21.3	0	
3005	3	5	100	0.000000000001	0.000000001	true	2020/4/17	21.3	0	
3006	3	6	100	0.000000000001	0.000000001	true	2020/4/17	21.3	0	
3007	3	7	100	0.000000000001	0.000000001	true	2020/4/17	21.3	0	
3008	3	8	100	0.000000000001	0.000000001	true	2020/4/17	21.3	0	
3009	3	9	100	0.000000000001	0.000000001	true	2020/4/17	21.3	0	
3010	3	10	100	0.000000000001	0.000000001	true	2020/4/17	21.3	0	
4020	4	20	100	0.000000000001	0.000000001	false	2020/4/17	21.3	55	

- Set some rule in labview program to define measurement is good or bad.
- If it is good, write true in pass column. If it is bad , write false in pass column.
- Search “false” in the schema to find which channel is bad. According to number of key, we can know this measurement come from where

Primary key :
key_ID = chip*1000 + channel





Info | Tables | Columns | Indexes | Triggers | Views | Stored Procedures | Functions

Table	Column	Type
chip01	Channel	int
chip01	V	double
chip01	Cp	double
chip01	I	double
chip01	Pass	varchar(10)
chip01	Measure_Date	varchar(50)
chip01	temp	double
chip01	Hum	double
chip01	Arrival_Date	varchar(50)
chip01	Ship_Date	varchar(50)
chip02	Channel	int
chip02	V	double
chip02	Cp	double
chip02	I	double
chip02	Pass	varchar(10)
chip02	Measure_Date	varchar(50)
chip02	temp	double
chip02	Hum	double
chip02	Arrival_Date	varchar(50)
chip02	Ship_Date	varchar(50)

Toy Data

Primary key : Channel

Channel	V	Cp	I	Pass	Measure_Date	temp	Hum	Arrival_Date	Ship_Date
1	100	0.000000000001	0.000000001	true	2020/4/17	25	55		
2	100	0.000000000001	0.000000001	true	2020/4/17	25	55		
3	100	0.000000000001	0.000000001	true	2020/4/17	25	55		
4	100	0.000000000001	0.000000001	true	2020/4/17	25	55		
5	100	0.000000000001	0.000000001	true	2020/4/17	25	55		
6	100	0.000000000001	0.000000001	true	2020/4/17	25	55		
7	100	0.000000000001	0.000000001	true	2020/4/17	25	55		
8	100	0.000000000001	0.000000001	true	2020/4/17	25	55		
9	100	0.000000000001	0.000000001	true	2020/4/17	25	55		
10	100	0.000000000001	0.000000001	true	2020/4/17	25	55		
11	100	0.000000000001	0.000000001	true	2020/4/17	25	55		
12	100	0.000000000001	0.000000001	true	2020/4/17	25	55		
13	100	0.000000000001	0.000000001	true	2020/4/17	25	55		
14	100	0.000000000001	0.000000001	true	2020/4/17	25	55		
15	100	0.000000000001	0.000000001	true	2020/4/17	25	55		
16	100	0.000000000001	0.000000001	true	2020/4/17	25	55		

Toy Data

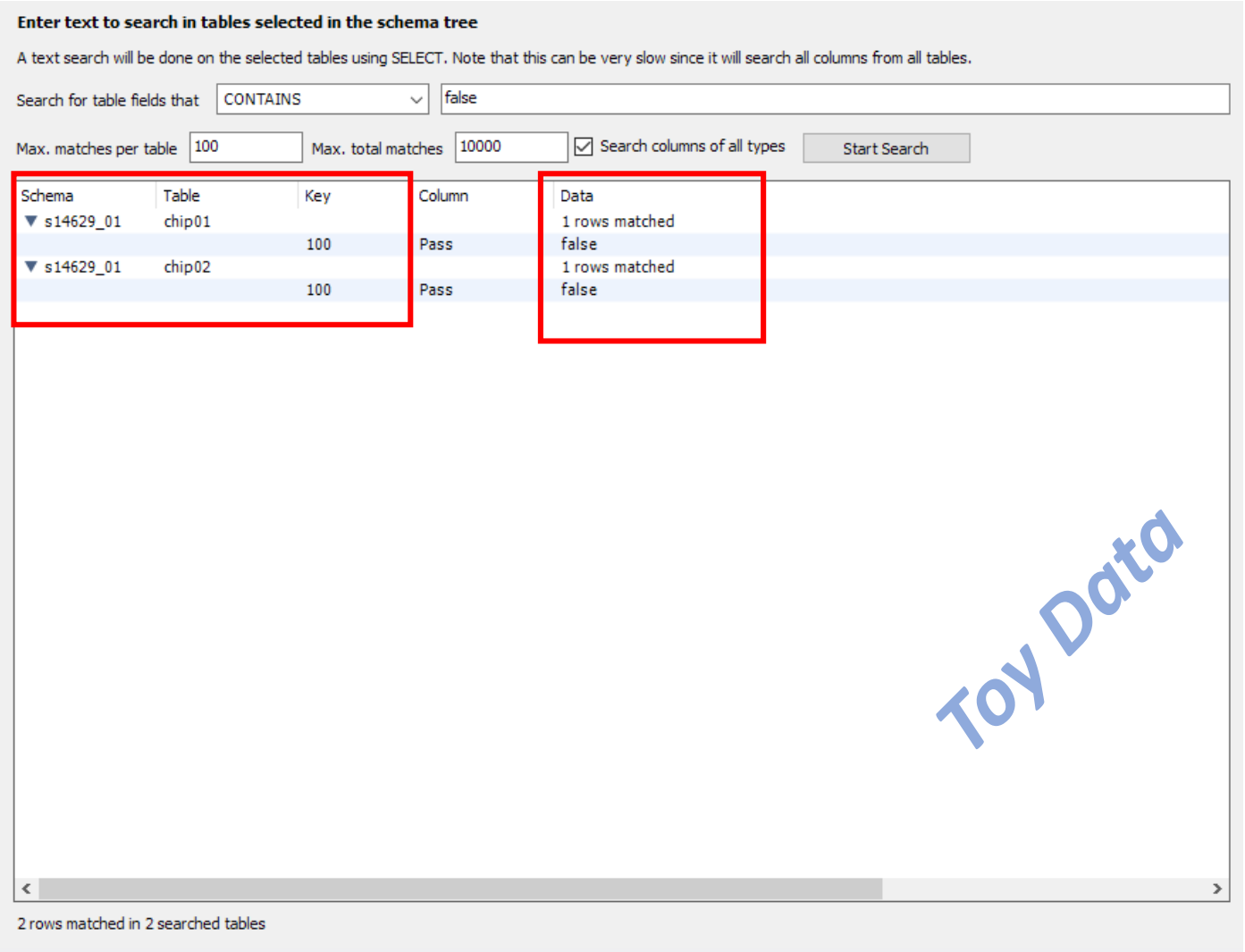
DataBase 2

Save one sensor in one database

- Schemas : Sensor_ID
  - Tables : Chip_ID
    - Columns : Channel
      V
      Cp
      I (if we test IV from DC pads)
      Frequency
      Pass (channel is good or not)
      Measure Date
      Temperature
      Humidity
      Arrival Date
      Ship Date
      …

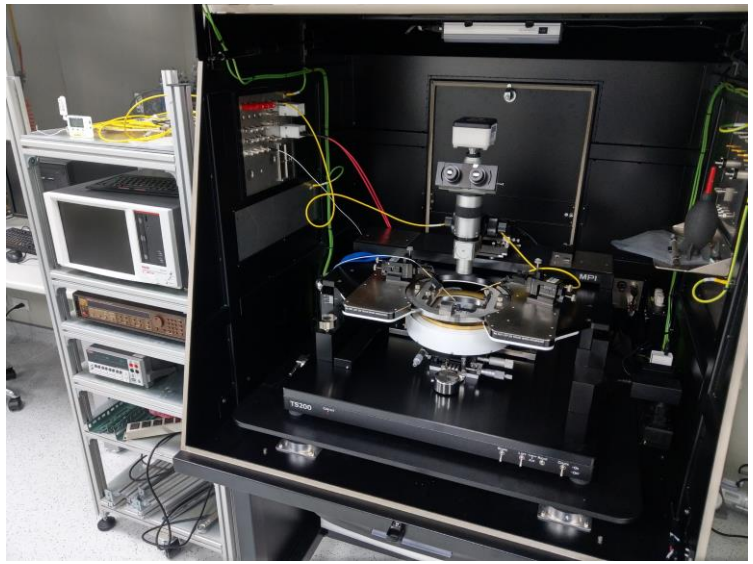
- Set some rule in labview program to define measurement is good or bad.
- If it is good, write true in pass column. If it is bad , write false in pass column.
- Search “false” in the schema to find which channel is bad. According to number of key, we can know this measurement come from where

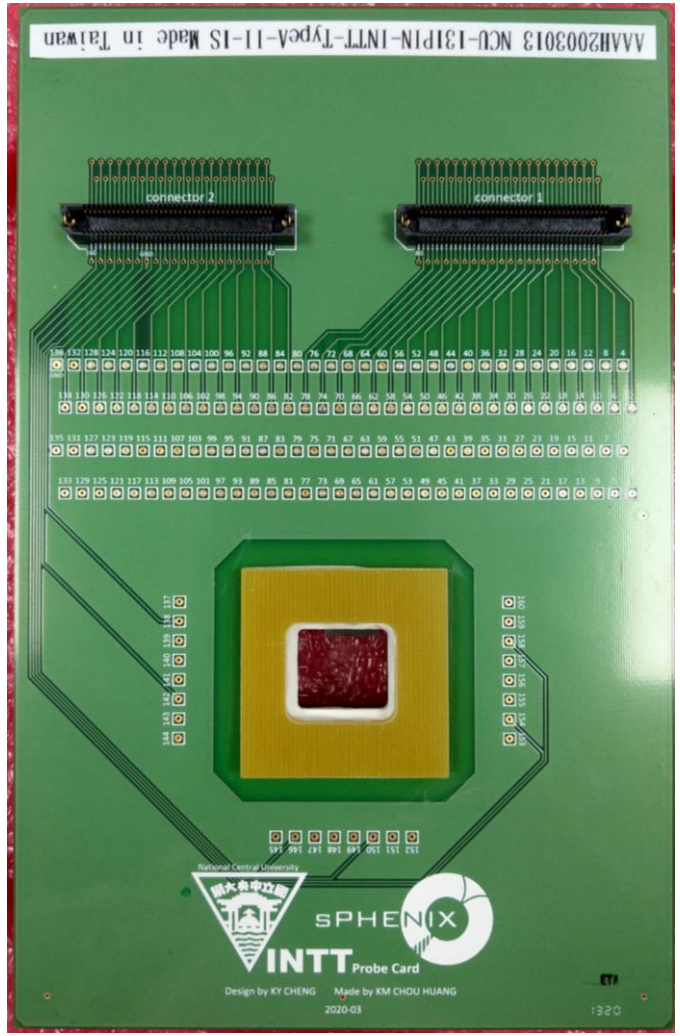
key : Channel



The Status of Testing

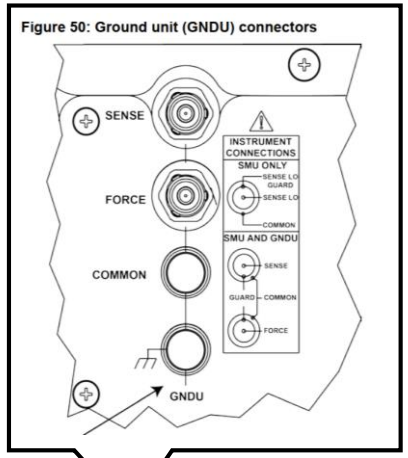
- All type of probe cards and convert card had arrived in NCU.
  - The Type A get on 4/21 and B on 4/16.
- The system was tested with type B-I probe card.
  - The function of keeping the voltage to scan all channel seem work.
  - Use the bad sensor to do the trace test.

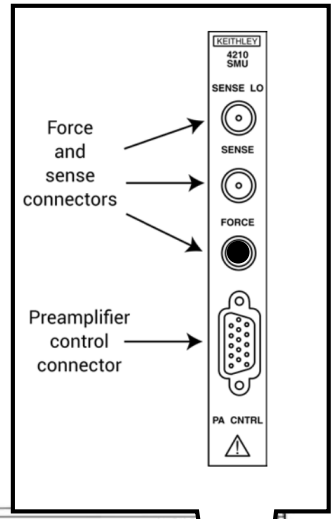


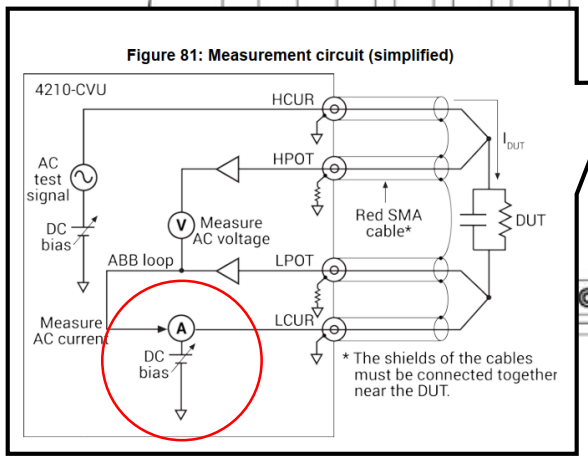


KEITHLEY 4200-SCS CV Measurement System of AC readout Sensor

- One module supply DC bias voltage (0-200V)
- One CV module measure capacitance with DC 0V (this DC voltage is different with above one)
- DC bias + AC signal connect to chuck to supply voltage
- The probe card connect to relay matrix. AC pad of target channel will be connected to low port of the CV module and another channels will be connected to common port.
- DC pads connect to GND to sure full depletion



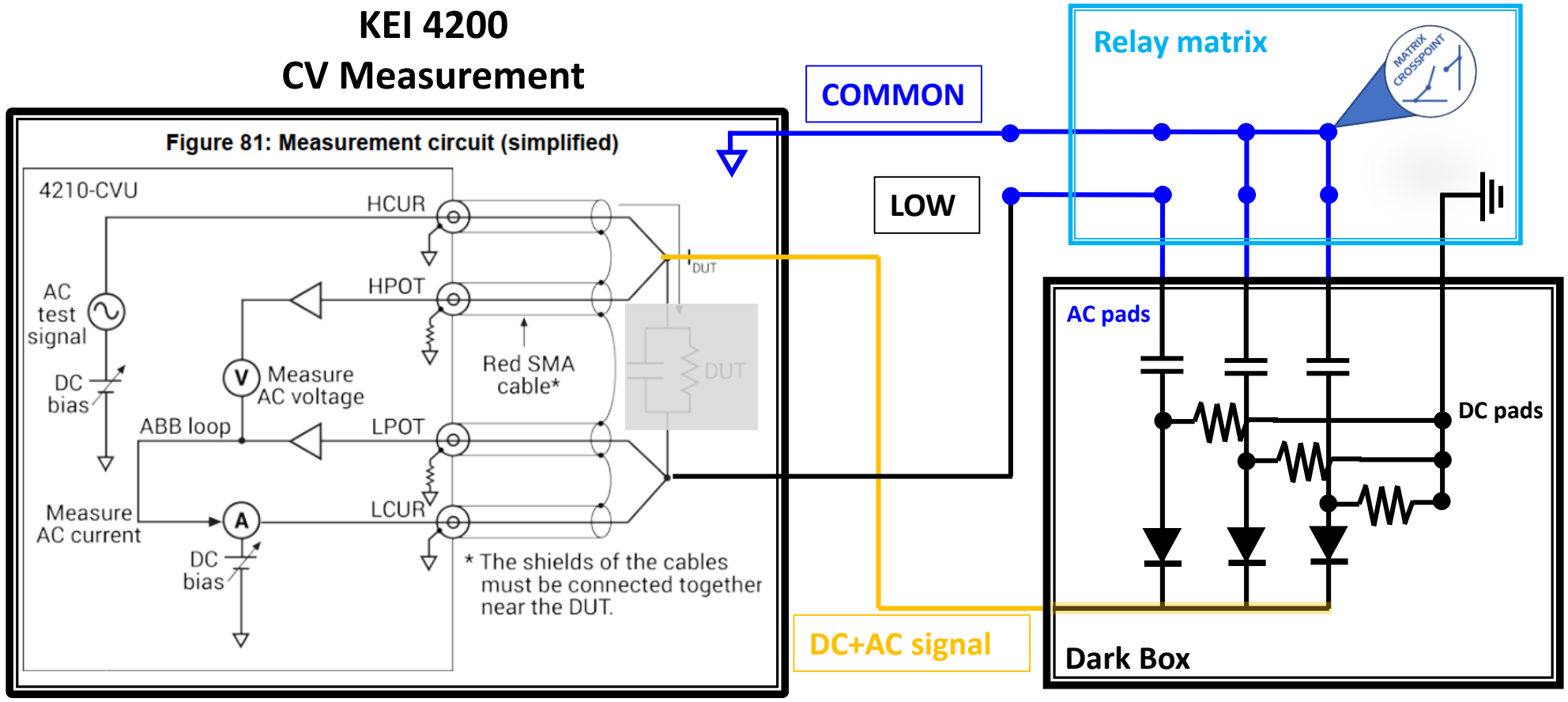




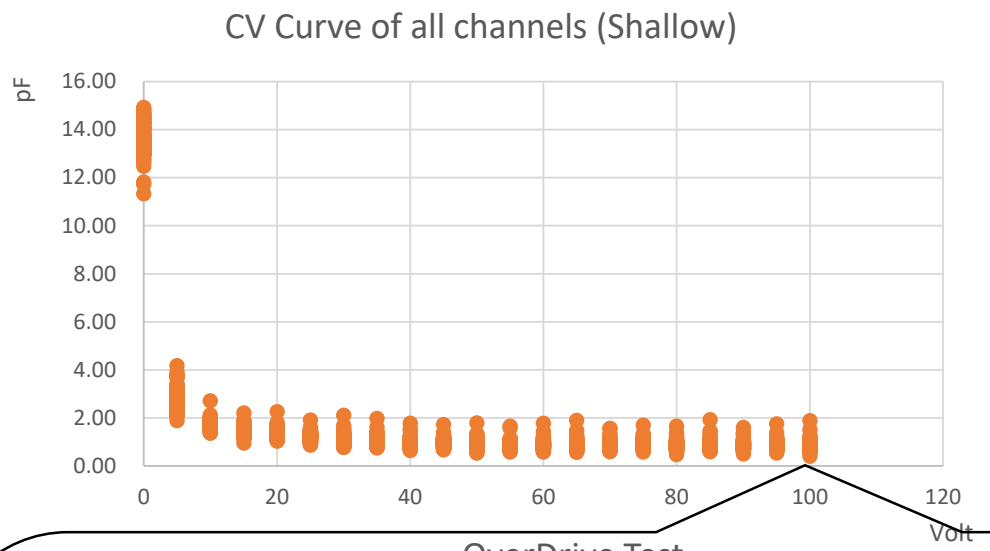
Measure Capacitance on LCUR (Low port)

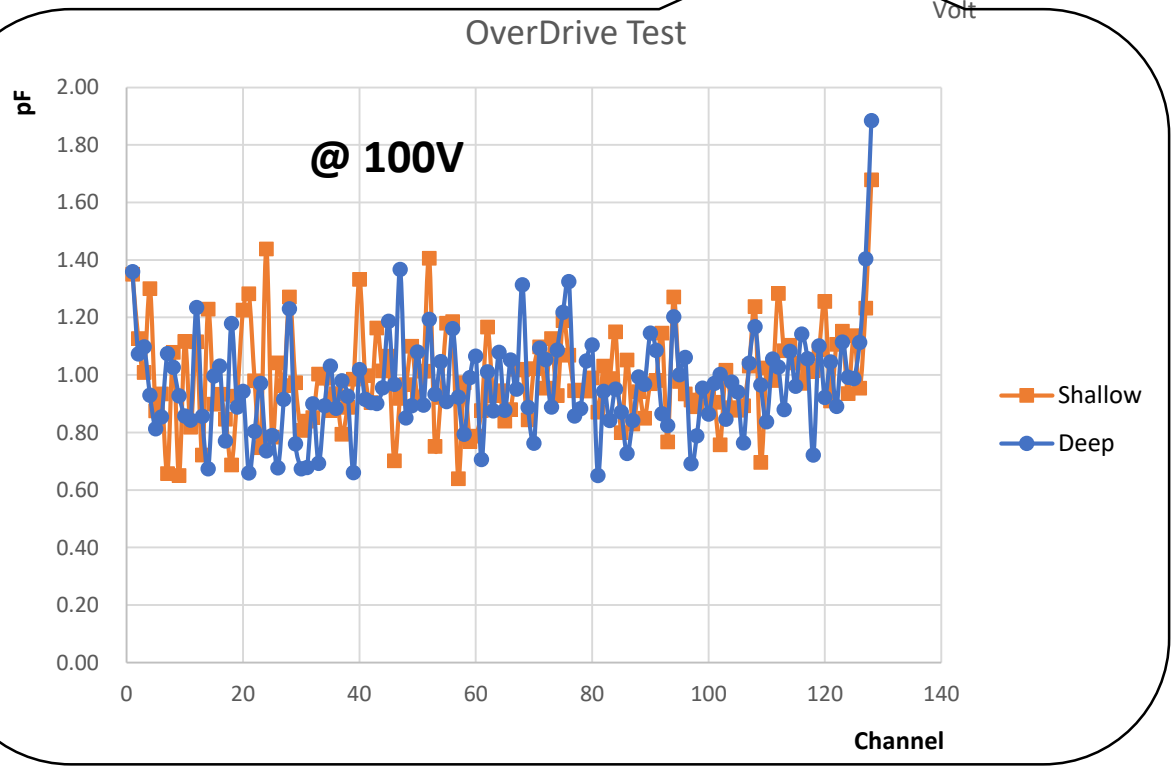
KEITHLEY 4200-SCS CV Measurement System of AC readout Sensor

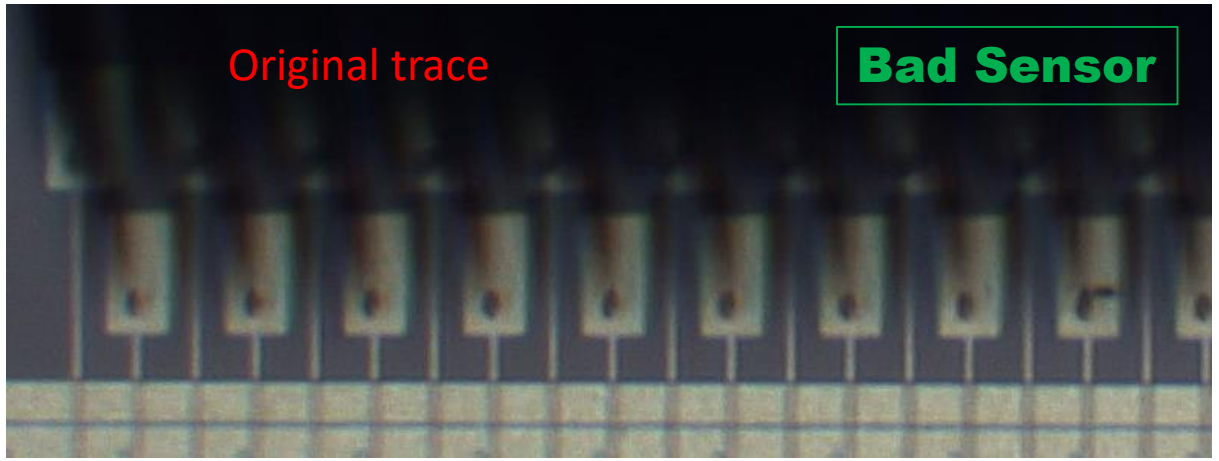
- Describe system with simplified circuit
- The circuit shows the contact situation when we measure one channel. Target channel connect to low port to measure current and others connect to common port

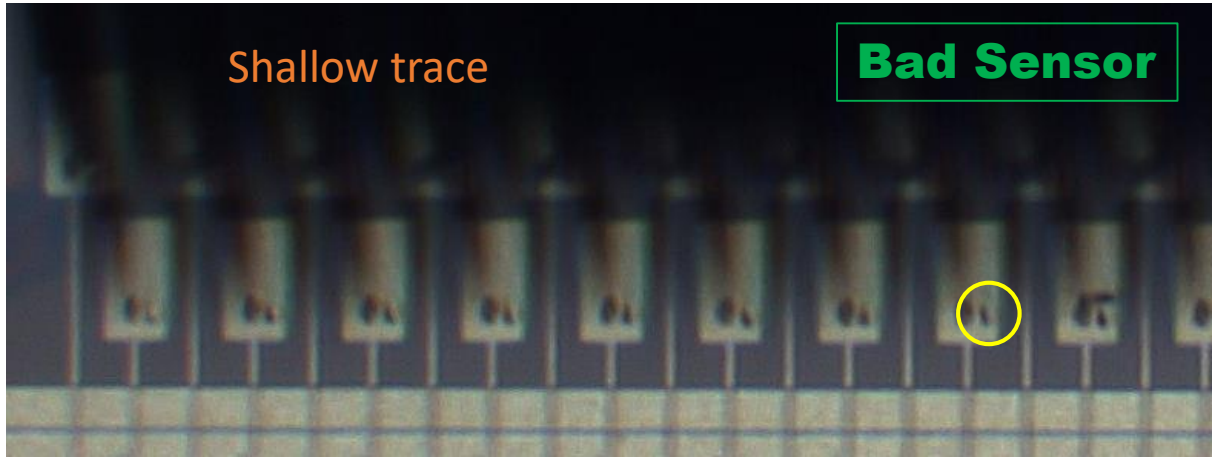


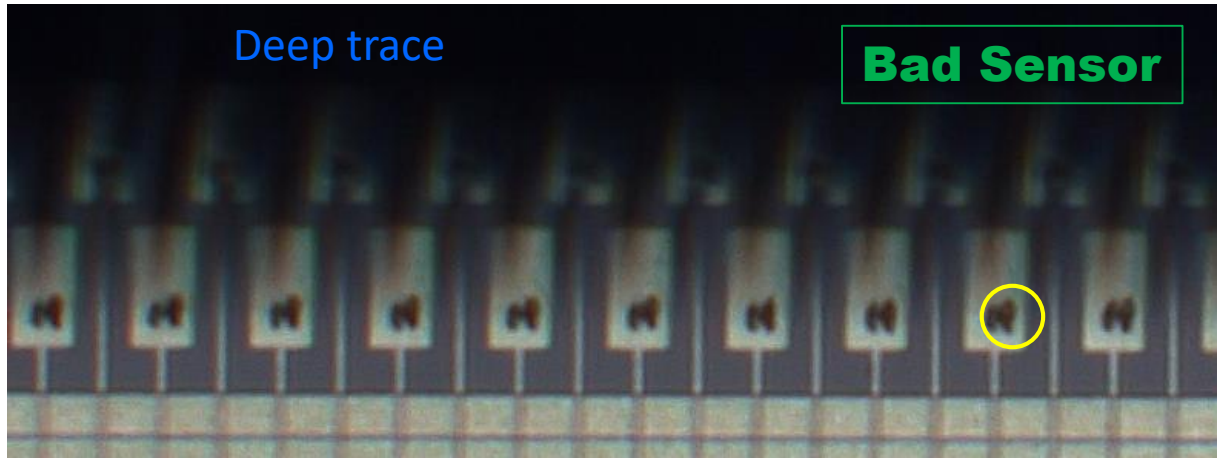
Trace Test (in Bad Sensor)





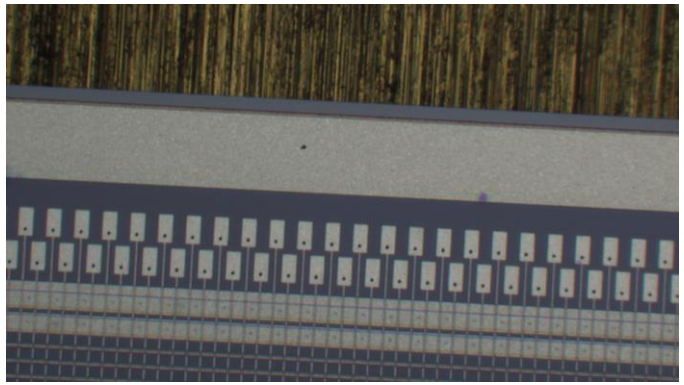


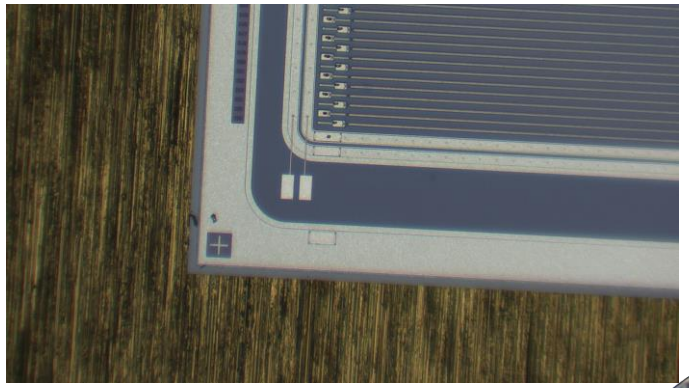
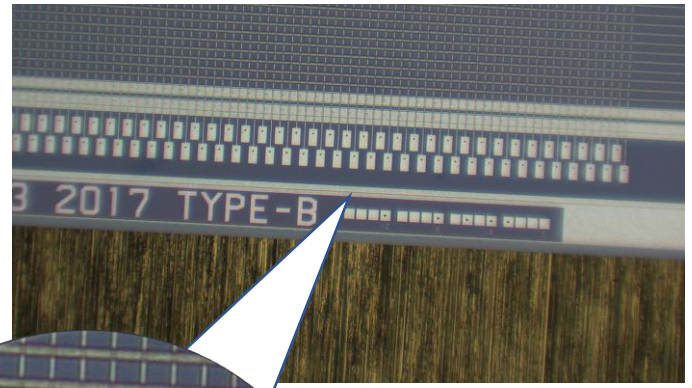


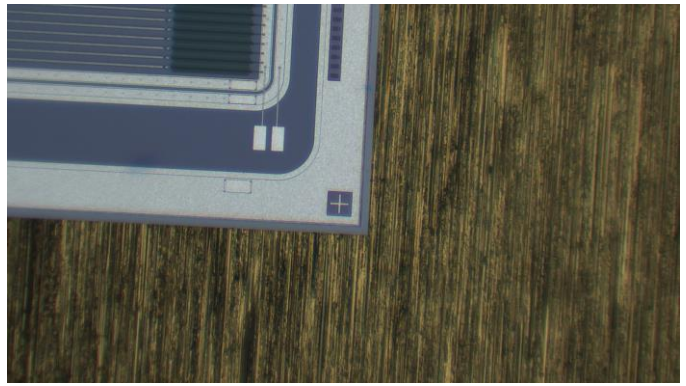


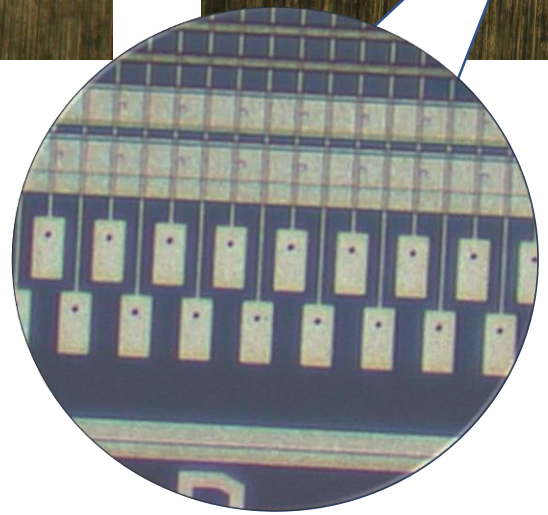
New Sensor picture (Arrival on 4/17)

S14629-01 Type B No.1158

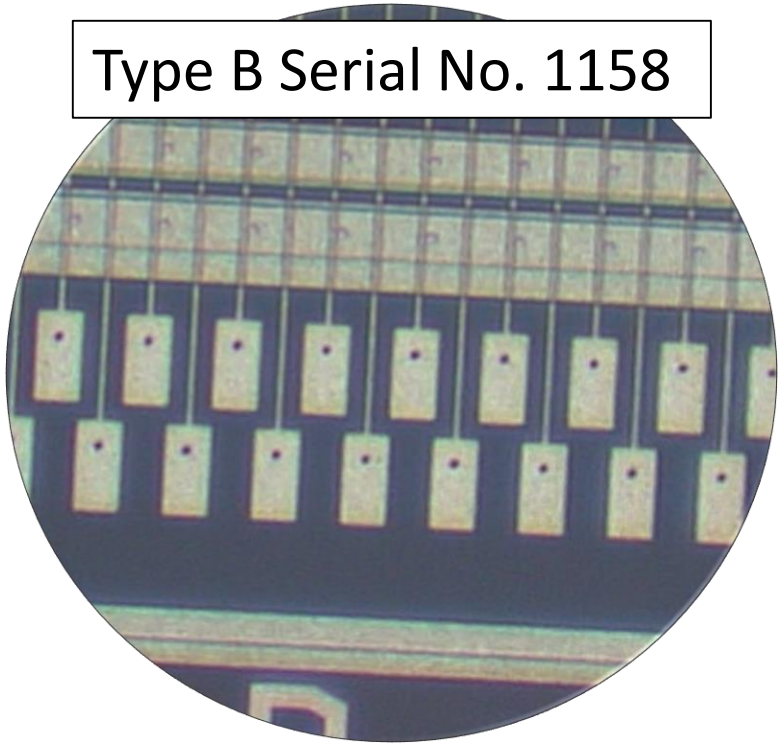


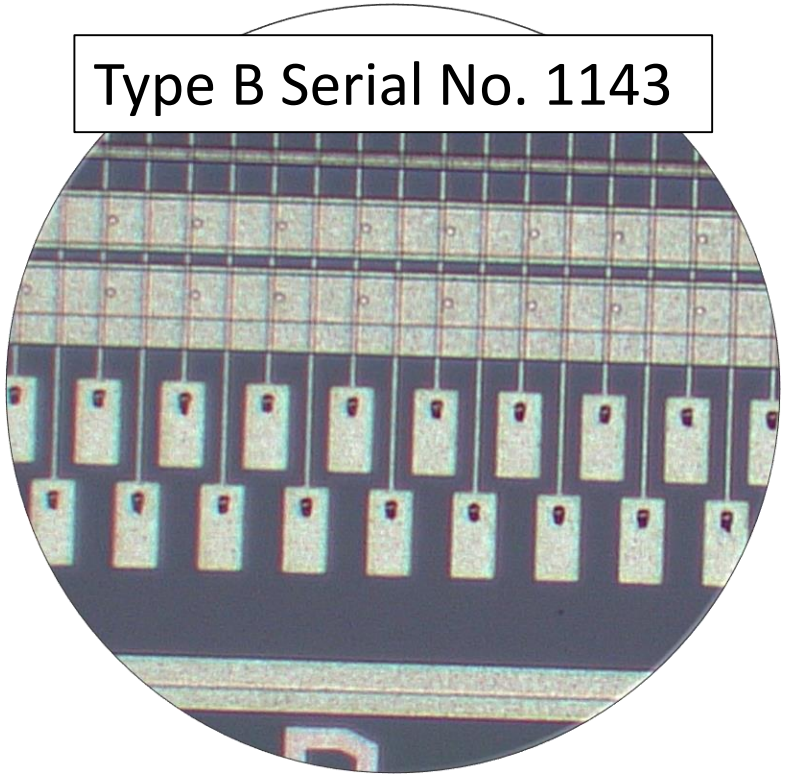
- We will look the edges of all sensors to sure they don’t have any breaks during shipment.
- The corners and label (or any faults) of all sensors will be taken photo.
- All Type B had done.

Probe Trace Compare

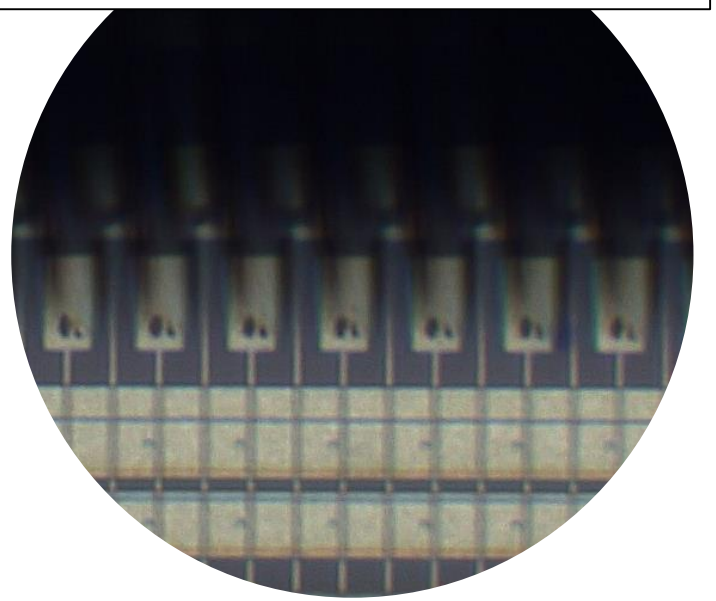
Type B Serial No. 1158



Type B Serial No. 1143



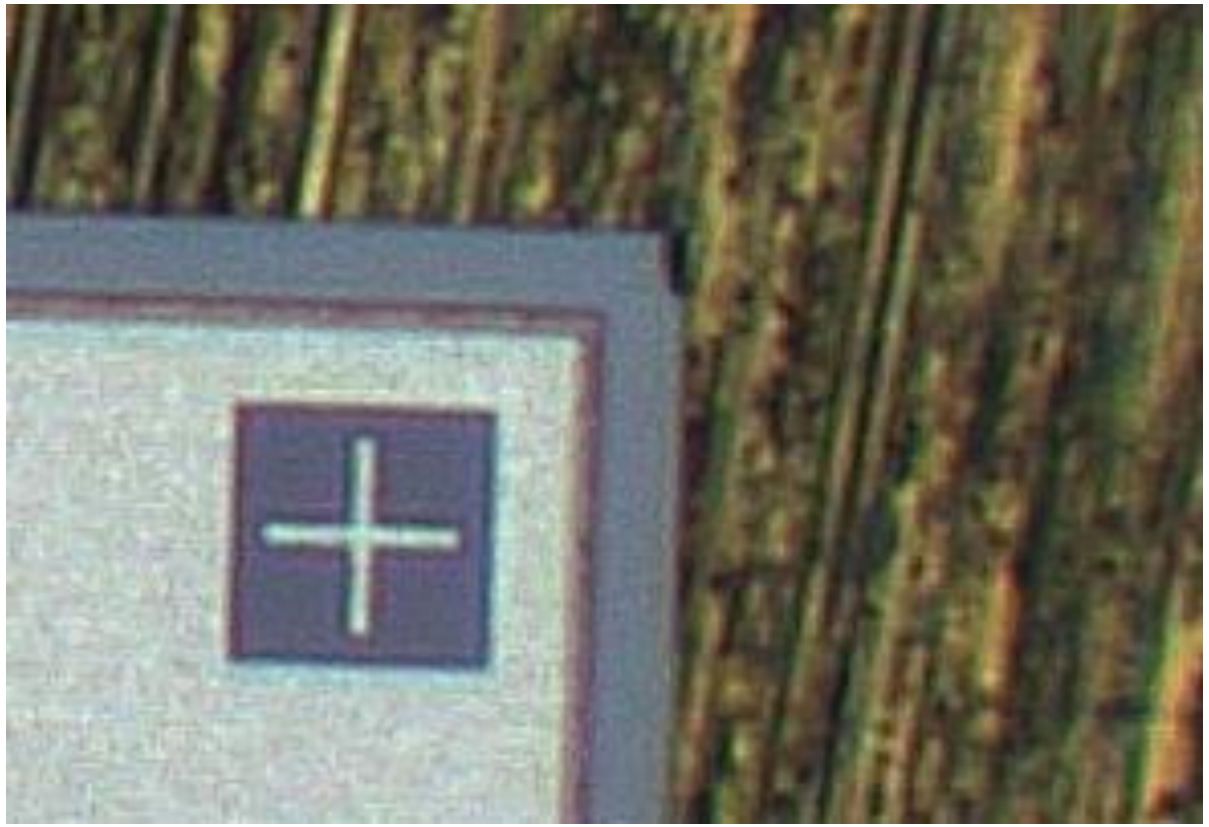
Shallow trace in bad sensor



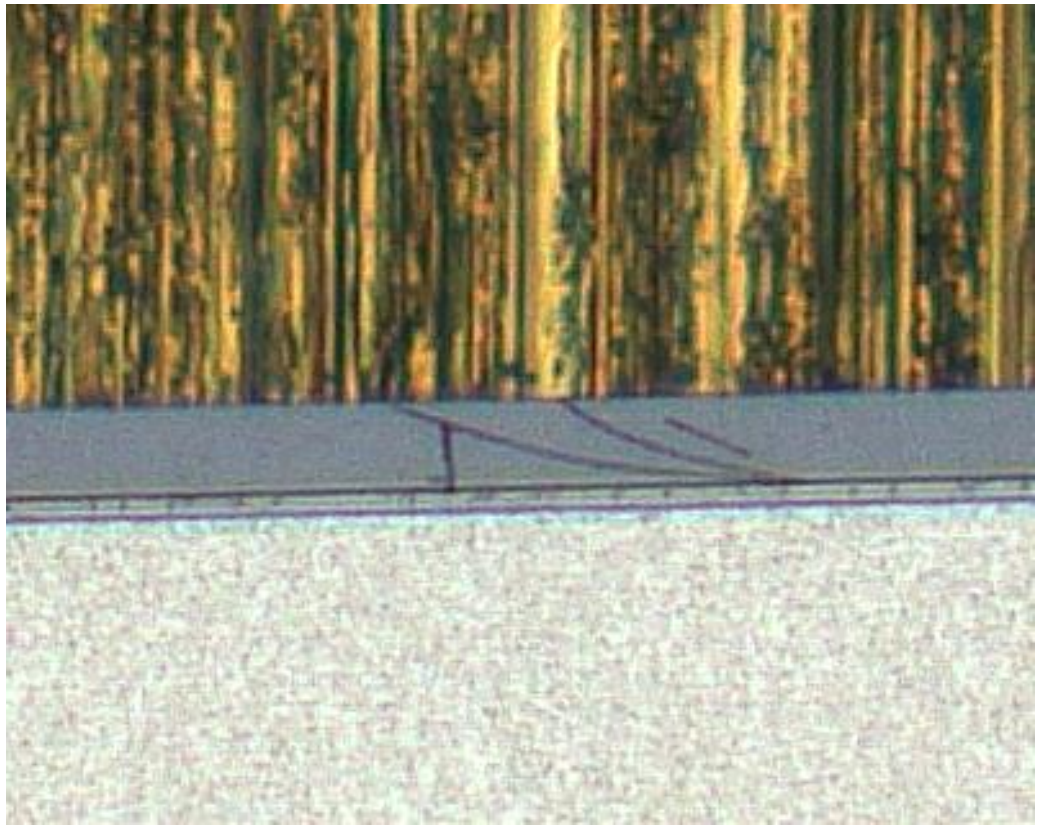
Appearance Check

- No. 1143 has a tiny mark that can’t easy clean by air or cleanroom swabs. It is hard to define is dust or tiny damage in microscope
- No. 1150 has a little different trace on the edge. I will go to check it.

Type B Serial No. 1143



Type B Serial No. 1150



Summary

- The appearance check will finish in 1-2 days. All type B sensors had done. Only No. 1143 and 1150 has a tiny mark, but all sensors didn't have any obvious breaks during shipment.
- In first test, CV measurement system was successful. It showed the right response, but I want to check the data is correct.
- Make sure we can keep tiny probe traces in all chips.
- Plan to start the measurement on 4/30.