

(2020.11.04 Revised)

Comparison Evaluation of Operational Amplifier

オペアンプ比較試験結果報告Vol.1



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I. Introduction

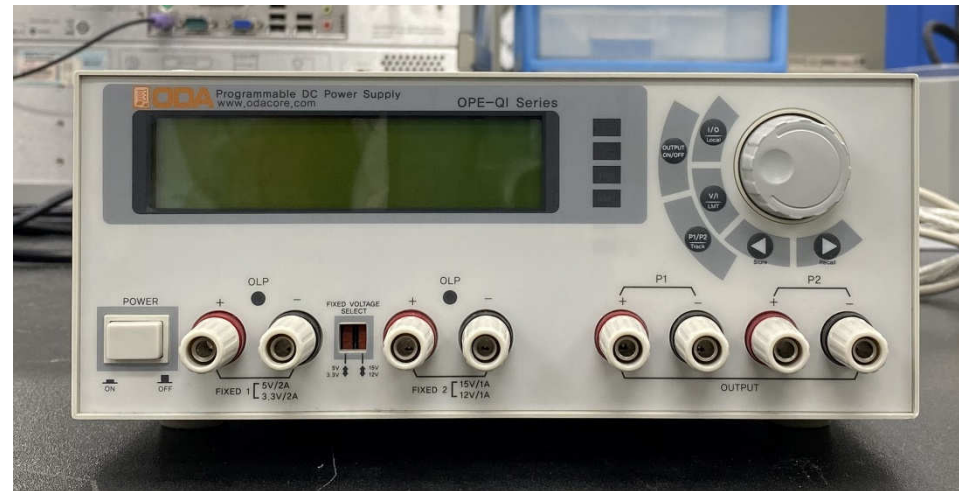


Introduction

- **Specimen:** Operational Amplifier (OP AMP)
- **Test:**
 - Electrical property measurements
 - X-ray analyses
 - SEM analyses
 - Environmental tests
- **Test term:** 2020. 08. 11 ~ 2020. 10. 19
- **Test environment:** (25±5) °C, Below 75% room humidity
- **Test apparatuses:**
 - DC power supply (OPE-QI Series, ODA, Korea)
 - 3-Phase power analyzer (43B, Fluke, USA)
 - X-ray (XTV160, Nikon, United Kingdom)
 - 3D digital optical microscope (KH-8700, Hirox, Japan)
 - Focused ion beam (Quanta 3D DualBeam, FEI, Netherland)
 - Small sized three-stage layered climate chamber (SXN403, ETAC, Japan)
 - Thermal shock chamber (DS-890-2, Daewon sci, Korea)
- **Etc:** Blind test
- **Contact:** Lee, Ju Ho ☎ +82-31-789-7282 / leejuho@keti.re.kr

Introduction

- **Test apparatuses:**
 - DC power supply (OPE-QI Series, ODA, Korea)



Introduction

- **Test apparatuses:**
 - 3-Phase power analyzer (43B, Fluke, USA)



Introduction

- **Test apparatuses:**
 - X-ray (XTV160, Nikon, United Kingdom)



Introduction

- **Test apparatuses:**
 - 3D digital optical microscope (KH-8700, Hirox, Japan)



Introduction

- **Test apparatuses:**
 - Focused ion beam (Quanta 3D DualBeam, FEI, Netherland)



Introduction

- **Test apparatuses:**
 - Small sized three-stage layered climate chamber (SXN403, ETAC, Japan)

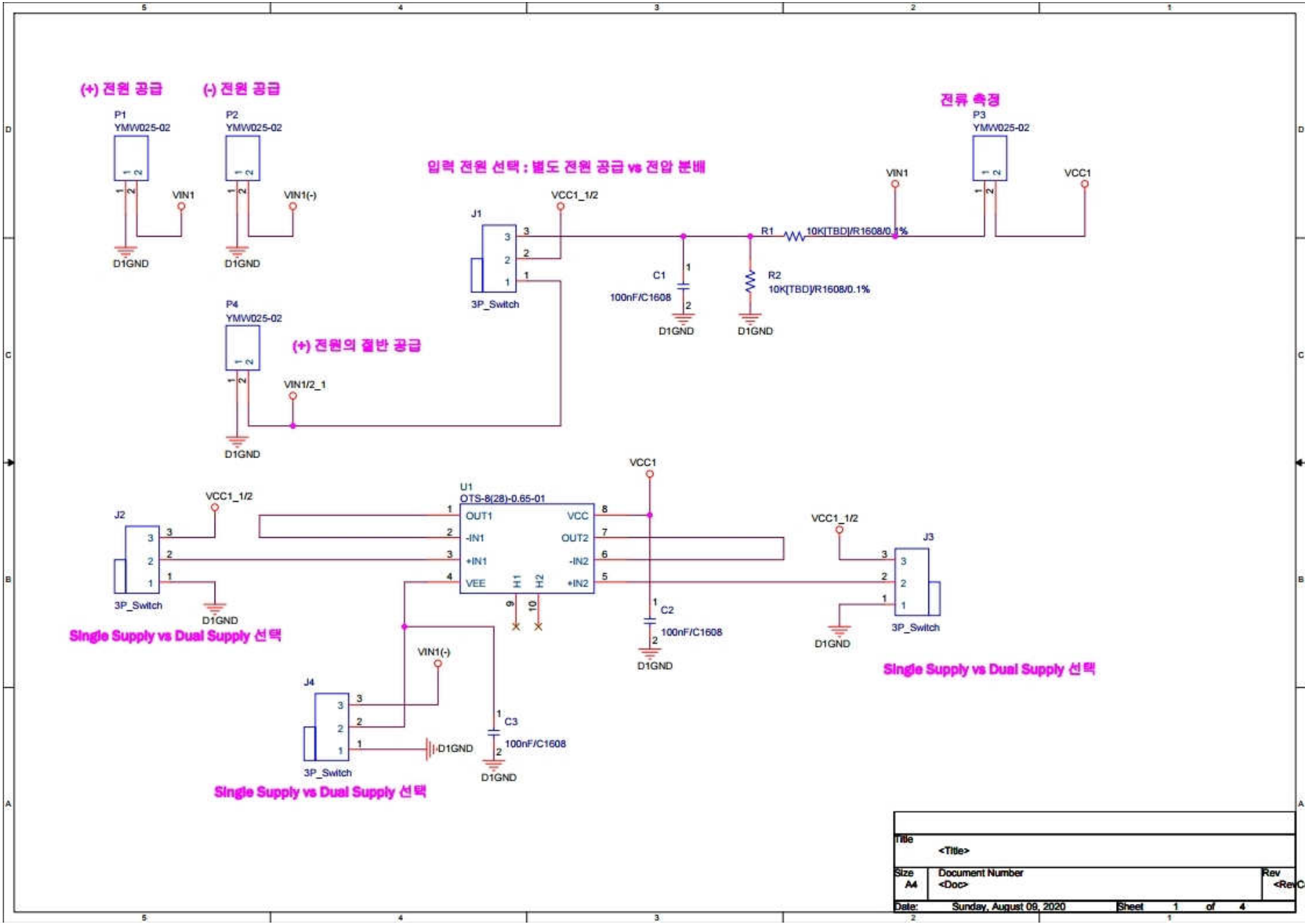


Introduction

- **Test apparatuses:**
 - Thermal shock chamber (DS-890-2, Daewon sci, Korea)

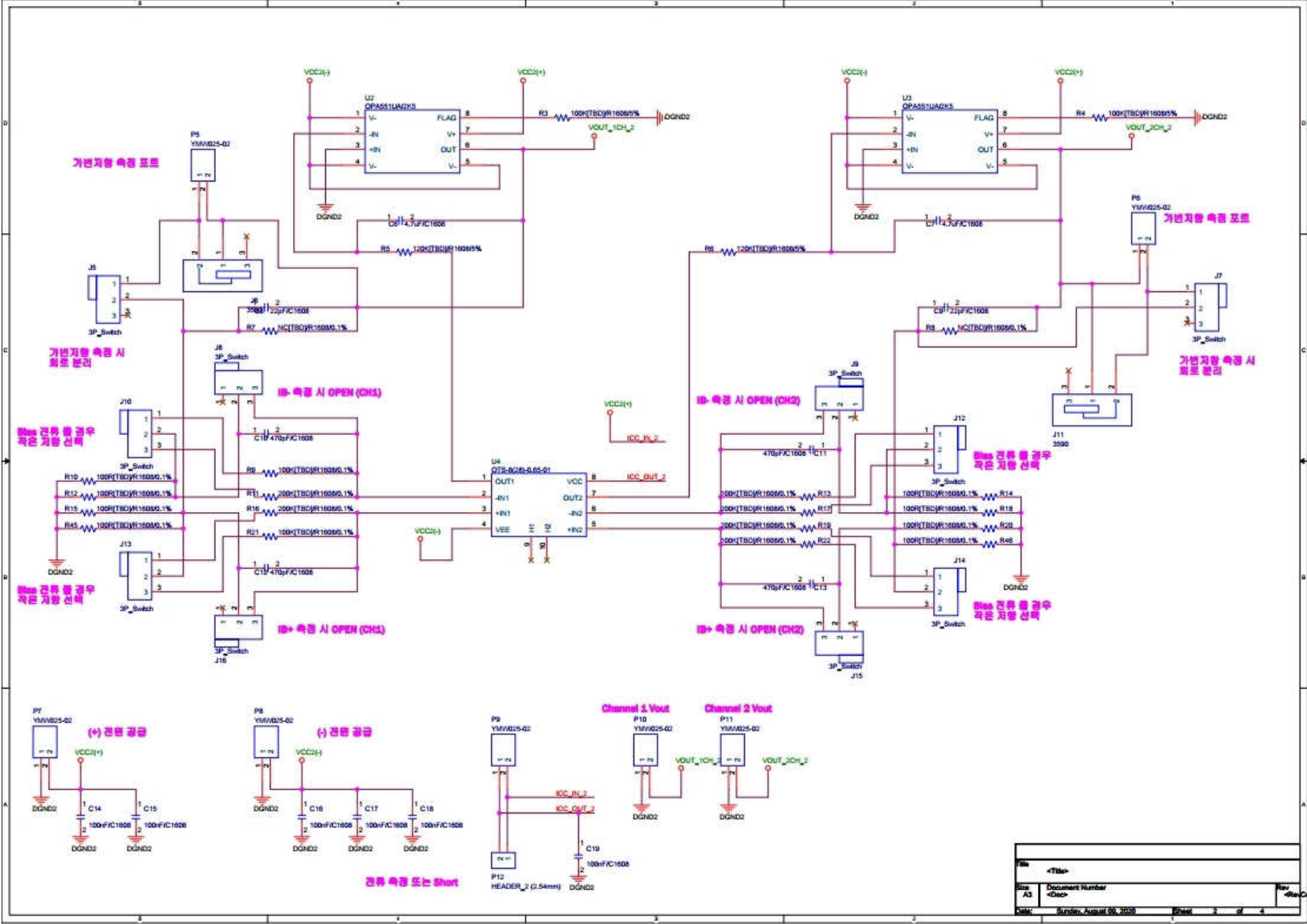


Circuit diagram



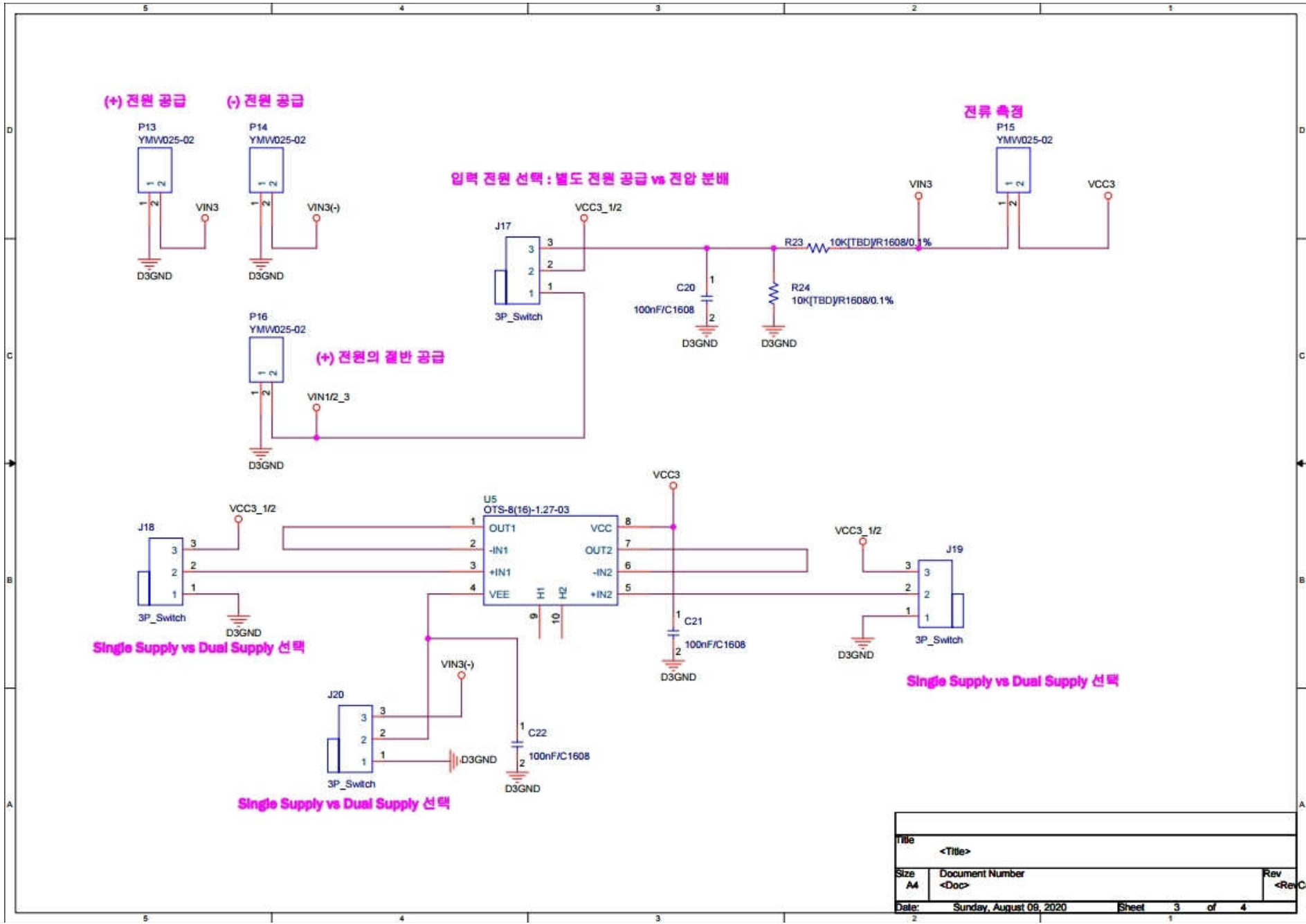
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Circuit diagram



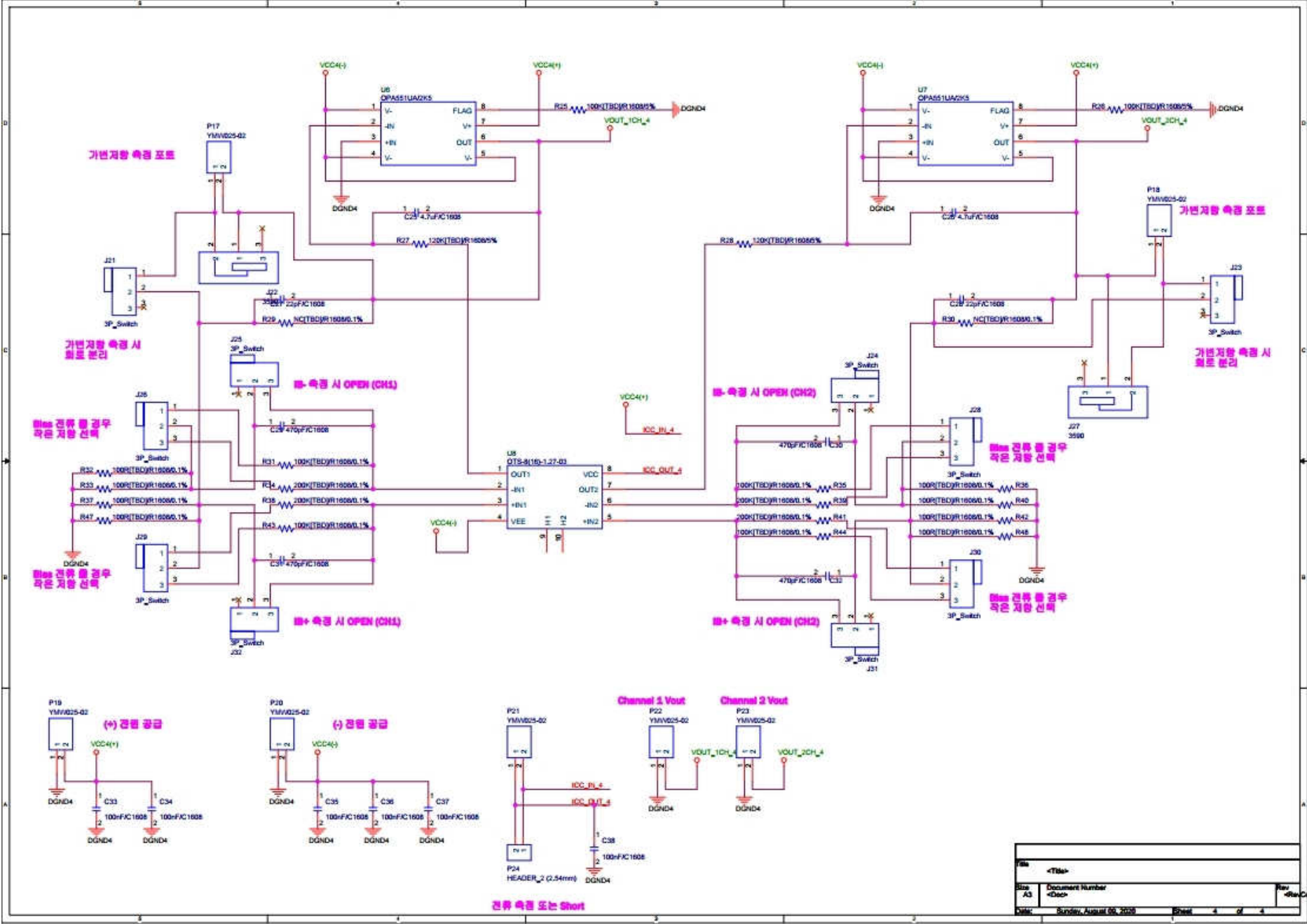
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Circuit diagram



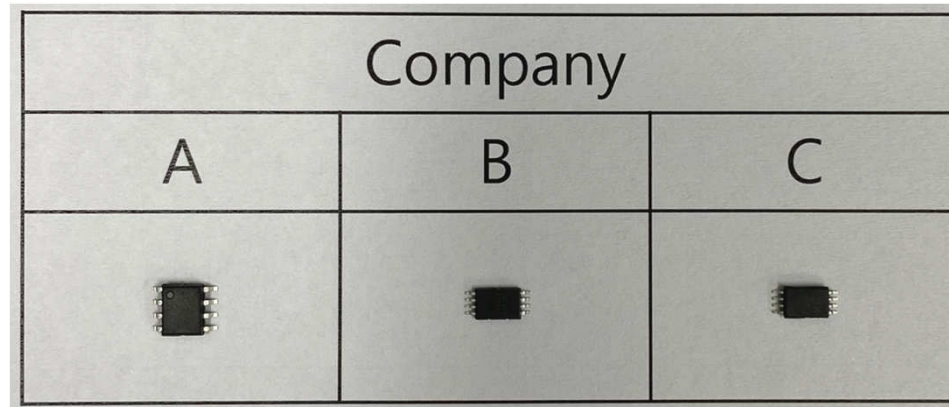
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Circuit diagram



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Date	Sunday, August 09, 2020	Sheet	4 of 4

Specimens



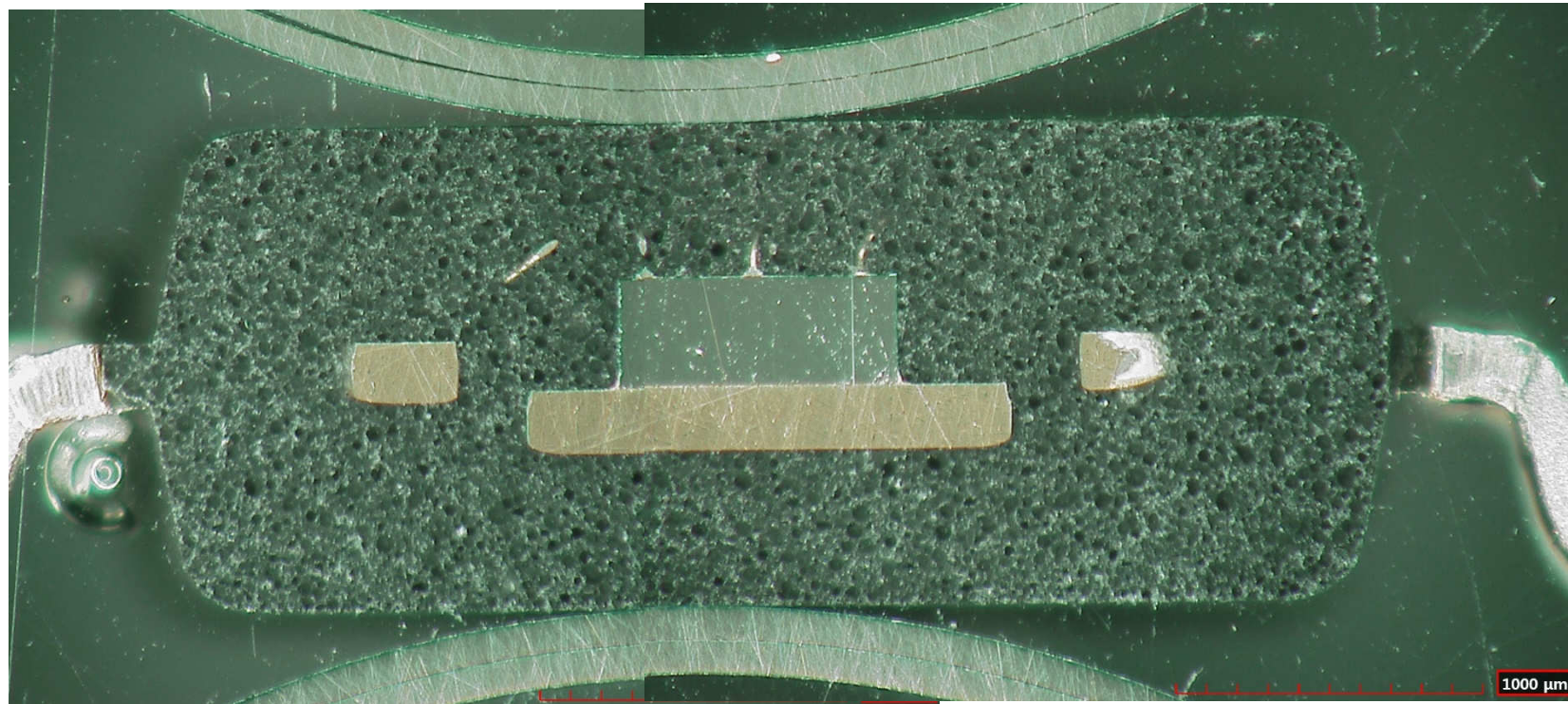
Sample	Power supply Voltages, V_{CC} (V)		Input differential voltage range, V_{IDR} (V)	Input common mode voltage range, V_{ICR} (V)	Output short circuit duration	Junction temperature, T_j (°C)	Storage temperature, T_{stg} (°C)	Input current, per pin, I_{IN} (mA)
	Single	Split						
A	32	±16	32	-0.3~32	Continuous	150	-55~125	50
B	36	±18	36	-0.3~36	Continuous	150	-65~150	unknown
C	36	±18	36	-0.3~36	Continuous	150	-55~150	-10

A: IK Semicon
 B: Diodes Corporated
 C: ROHM

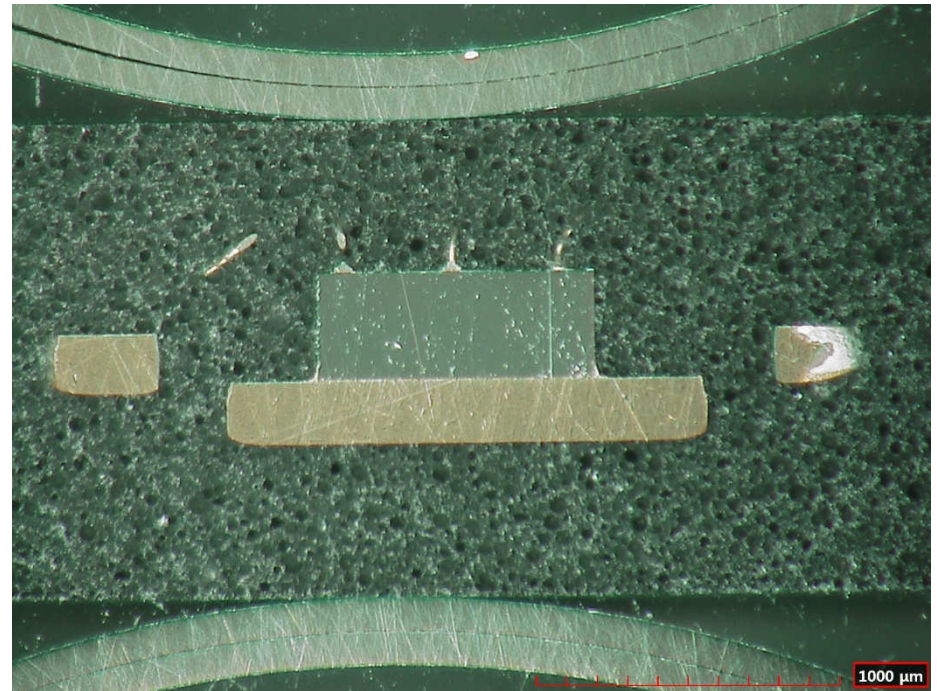
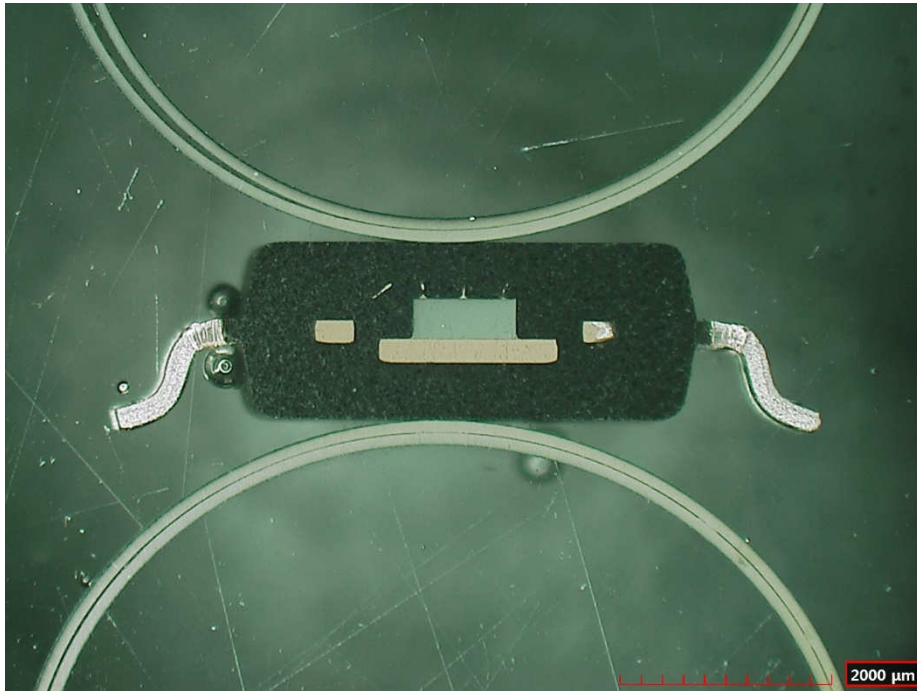
II. Optical microscope analyses (内部断面観察)



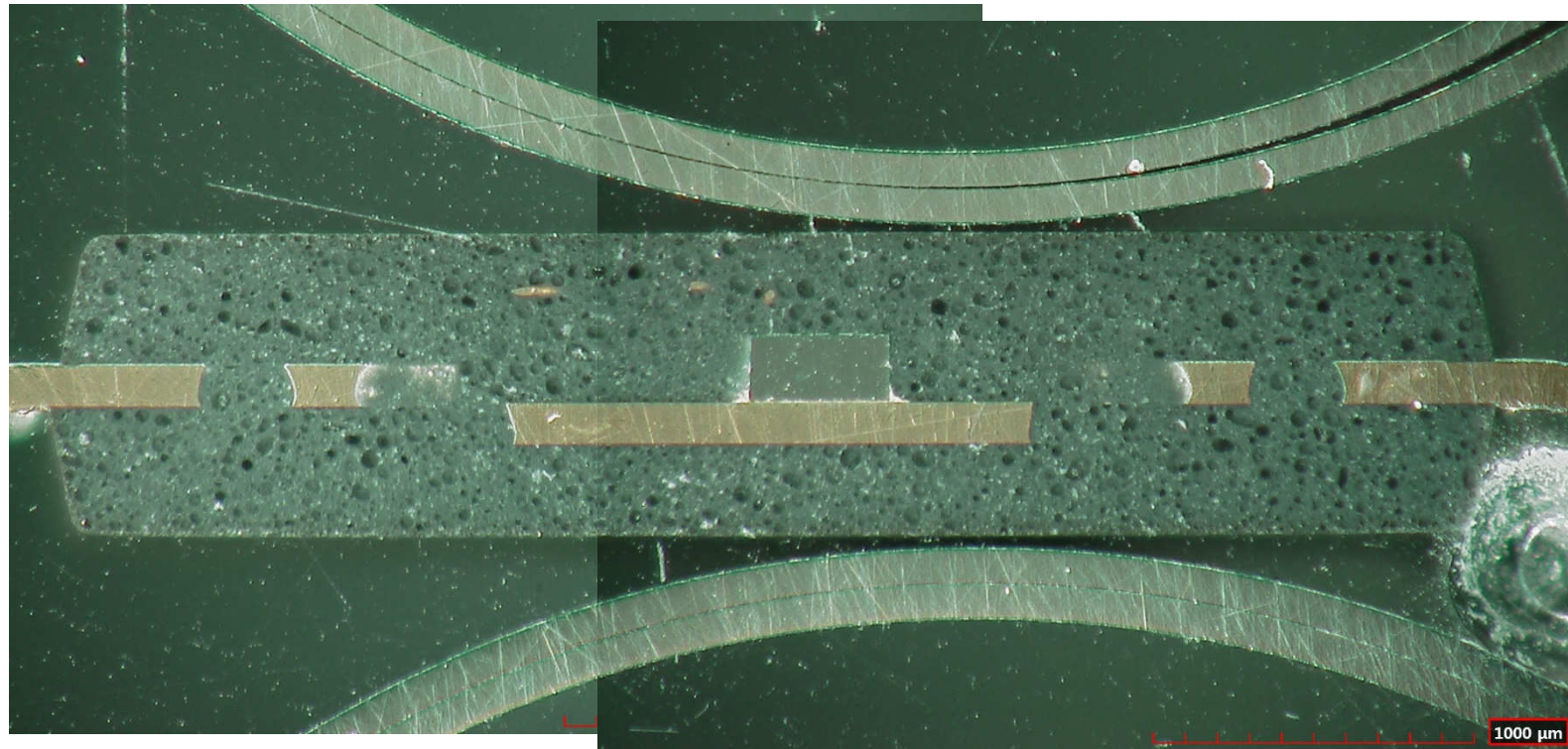
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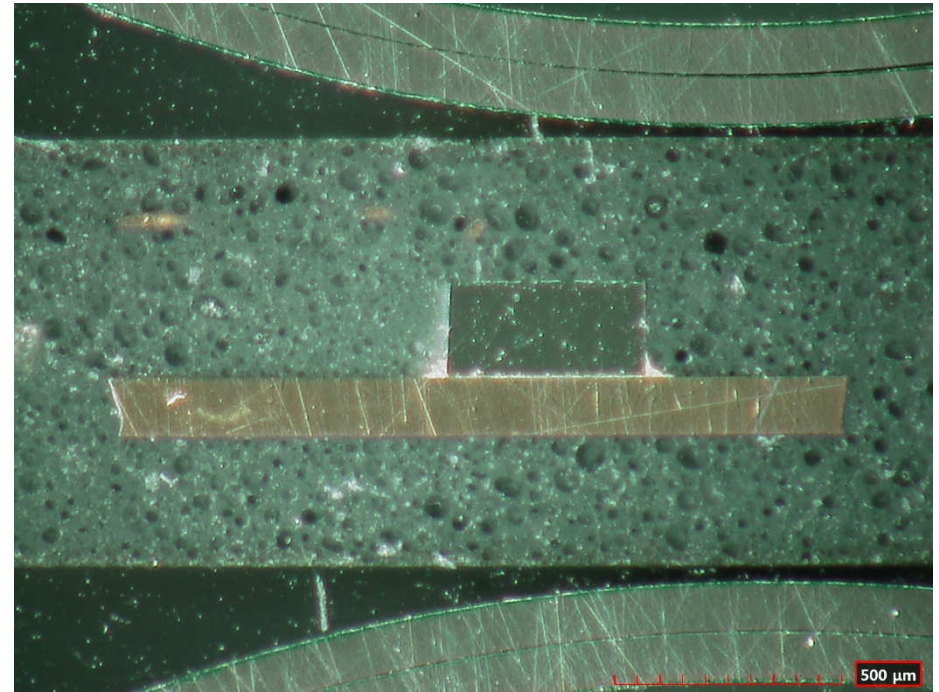
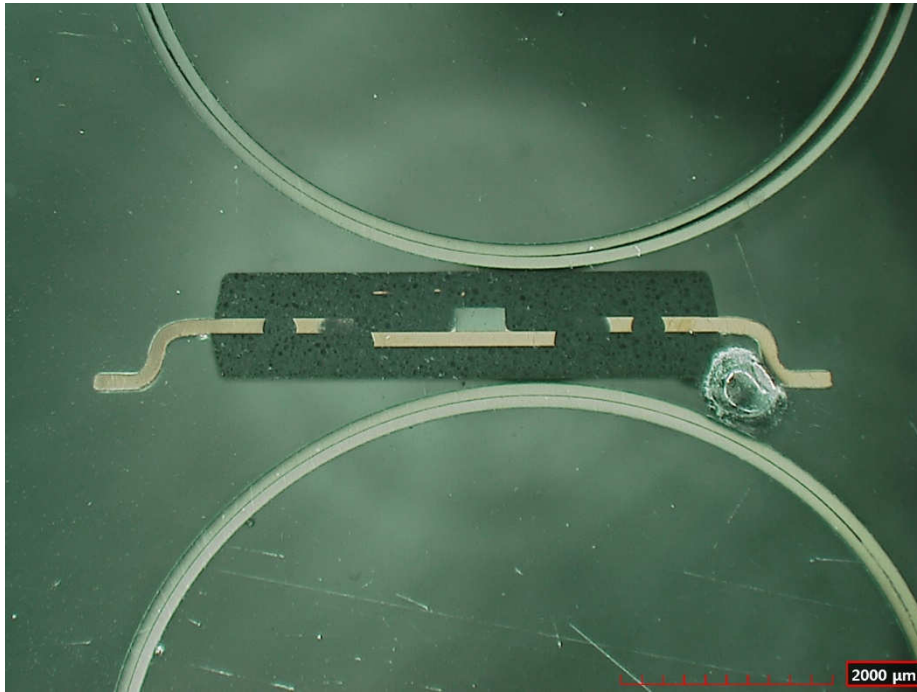
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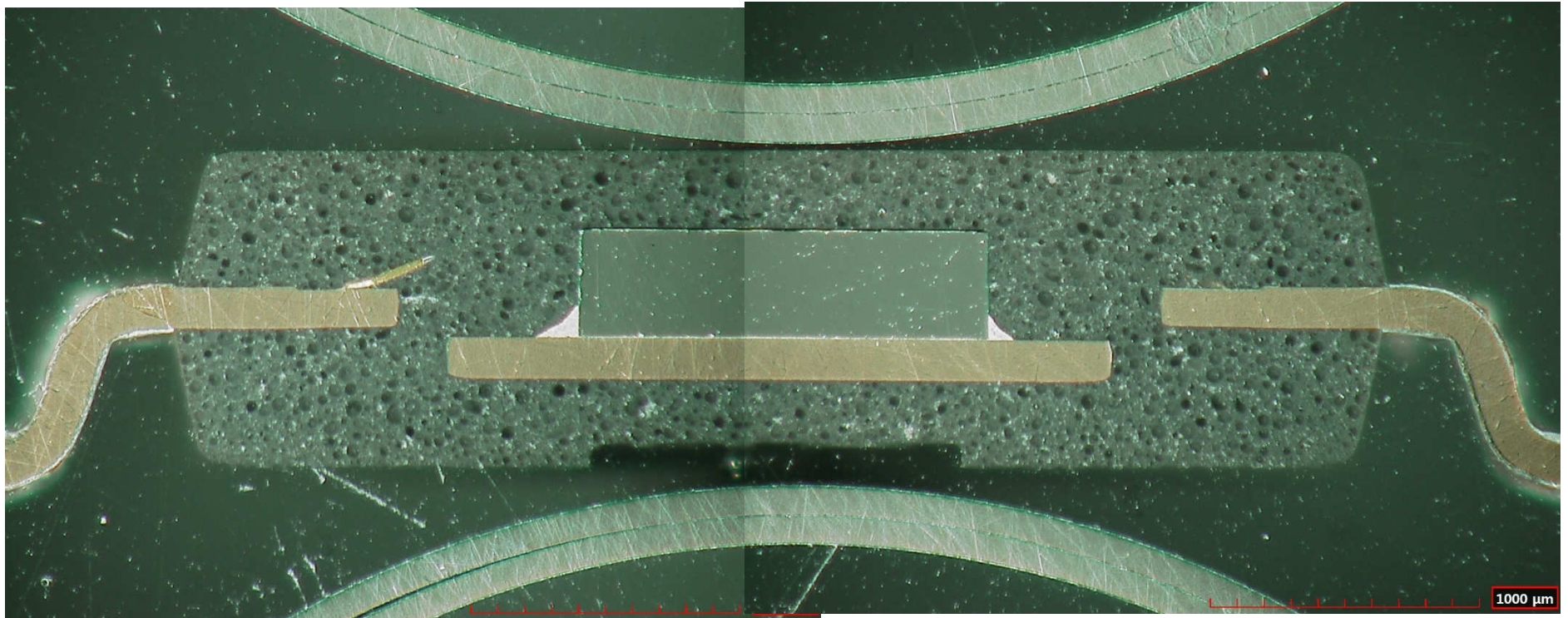
B社



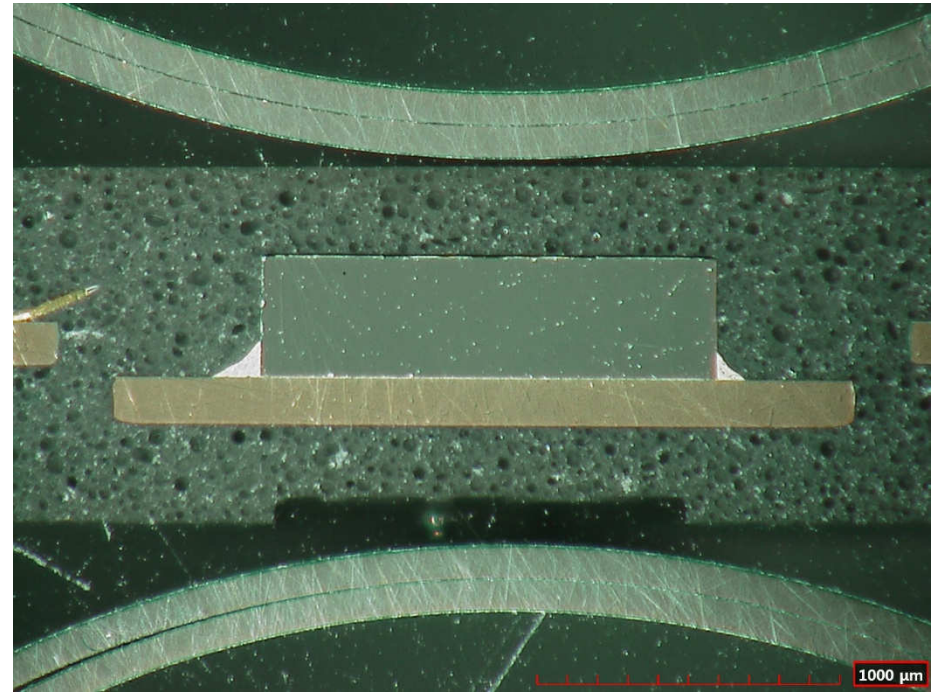
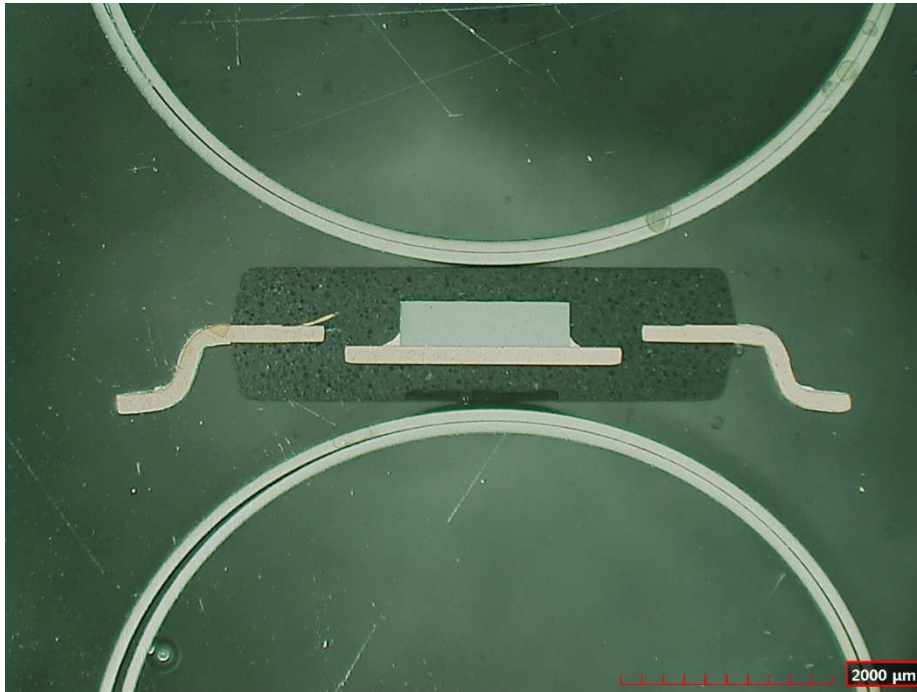
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C社



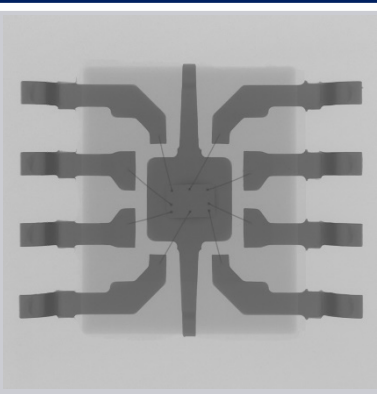
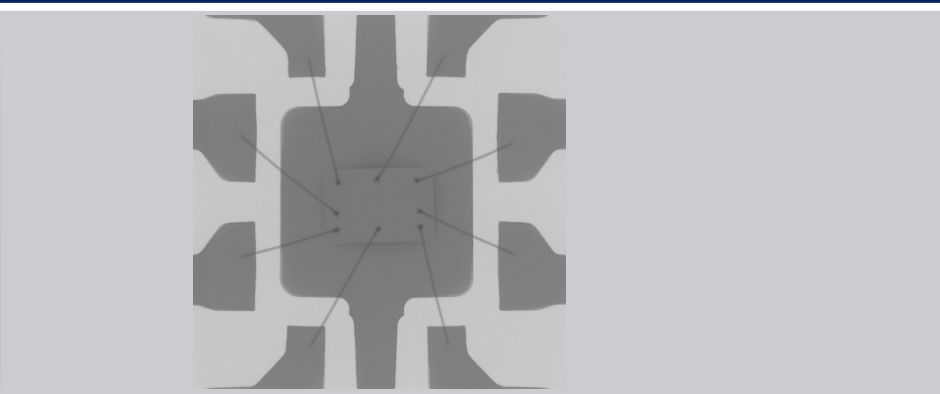
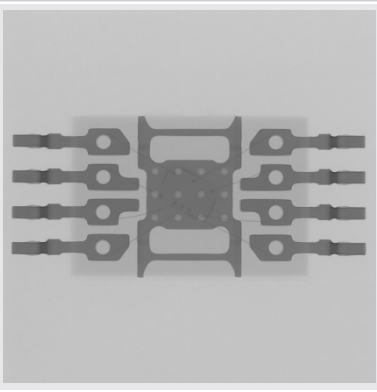
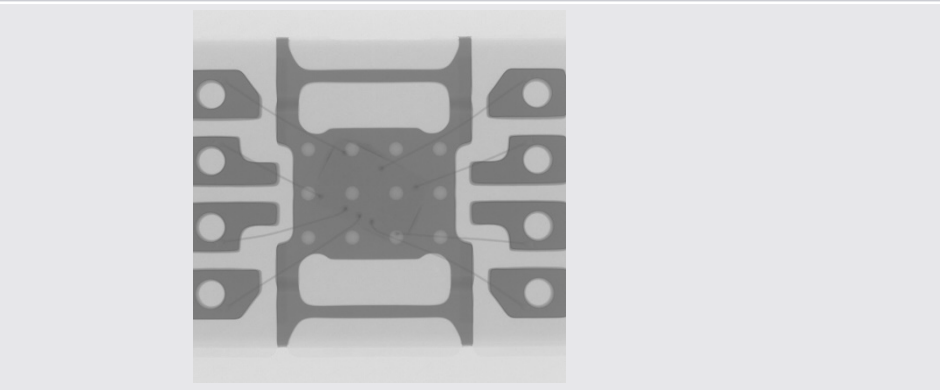
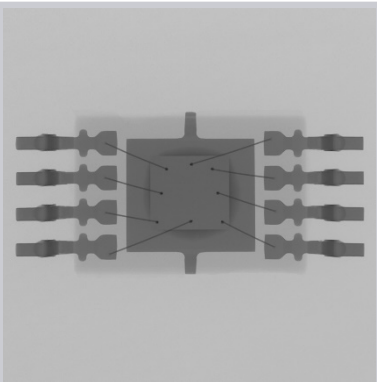
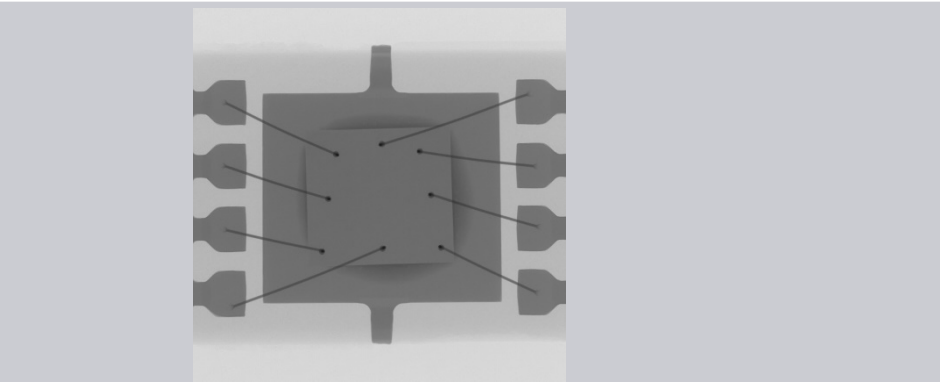
C社



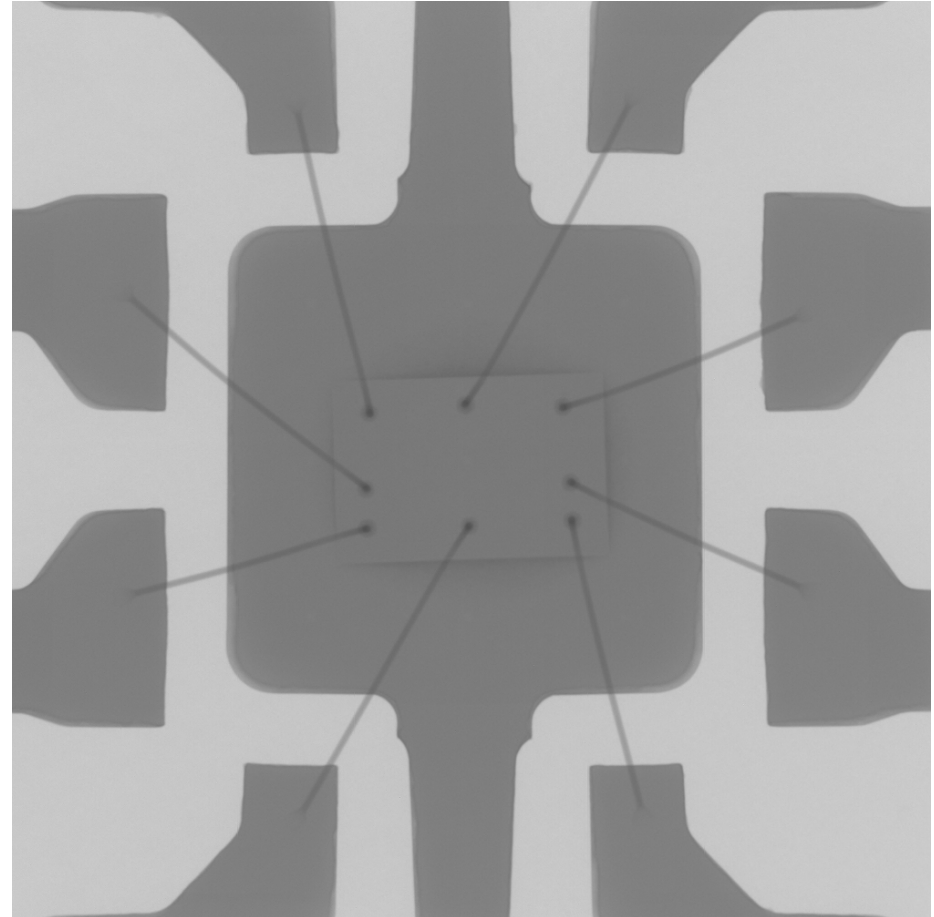
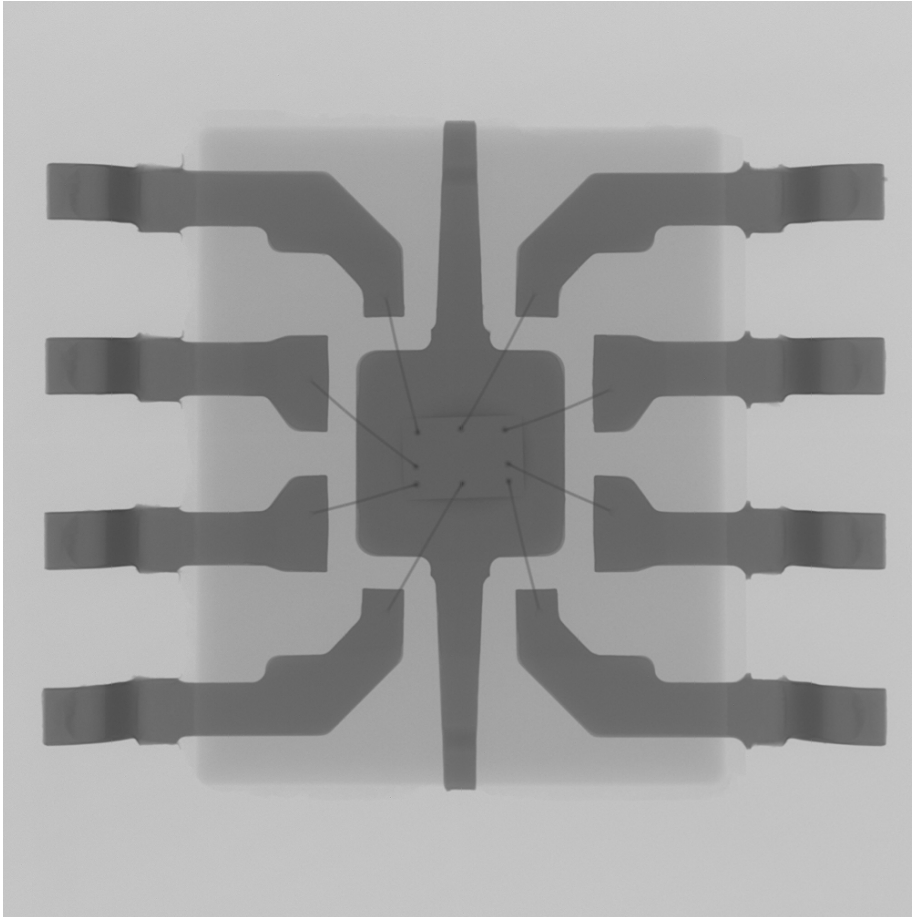
III. X-ray analyses



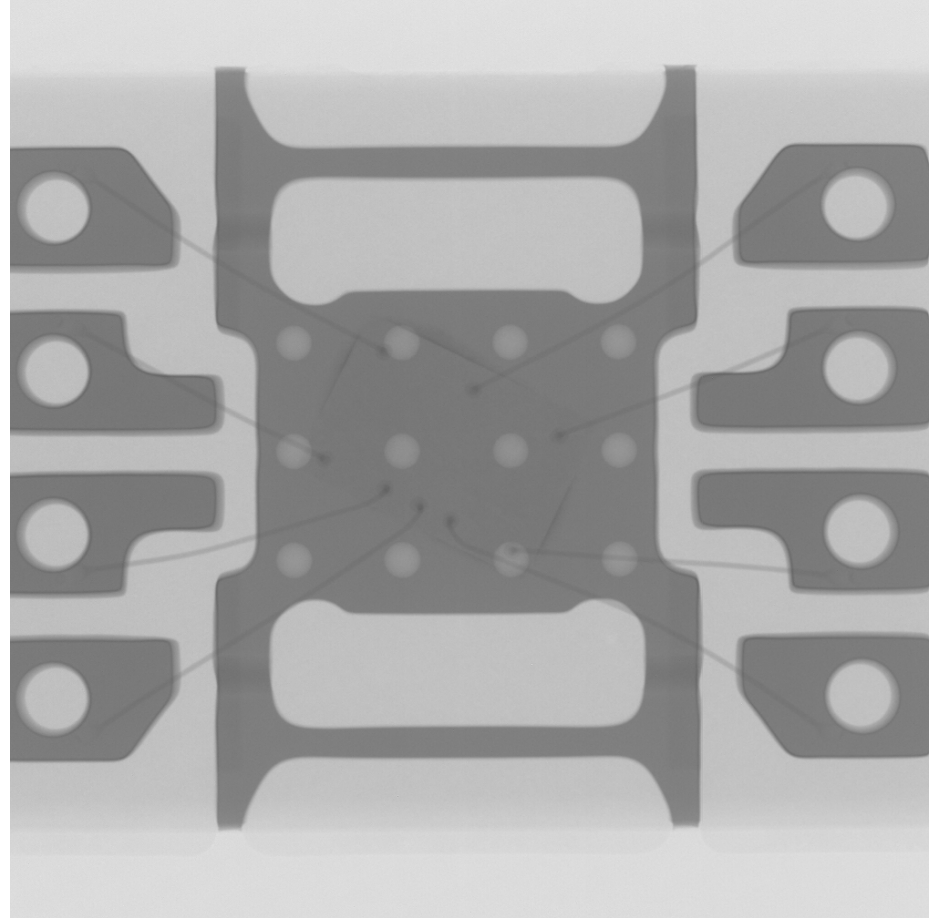
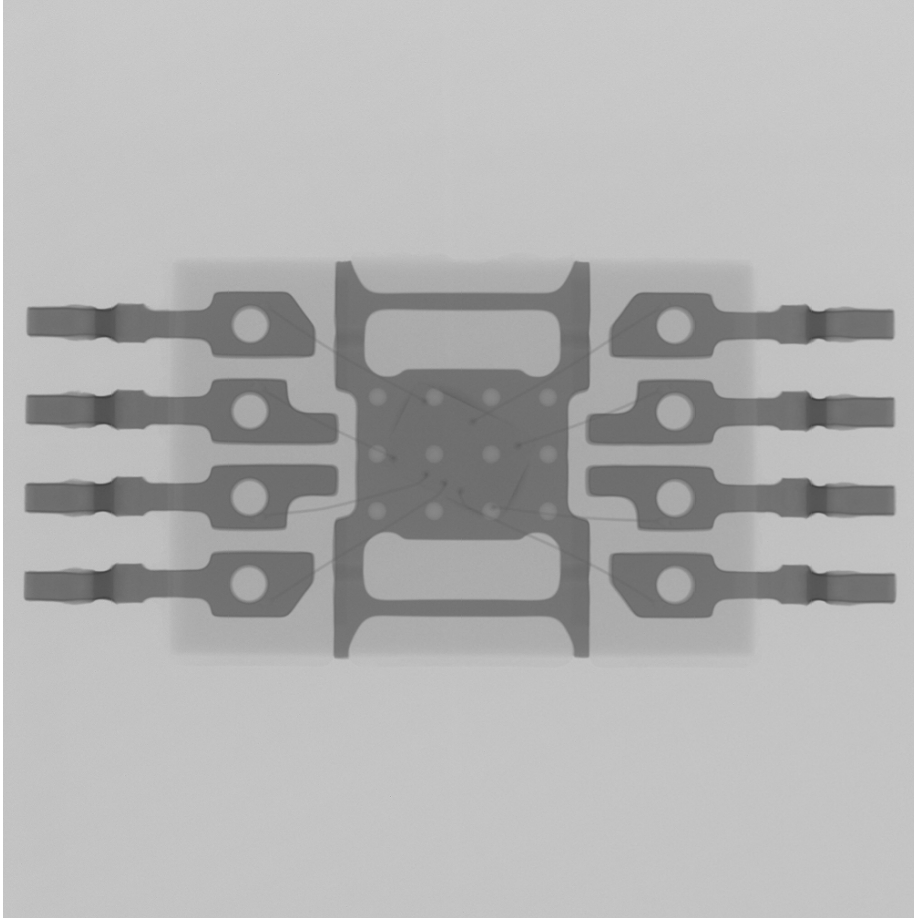
A/B/C社

Specimen	X-ray analyses	
A		
B		
C		

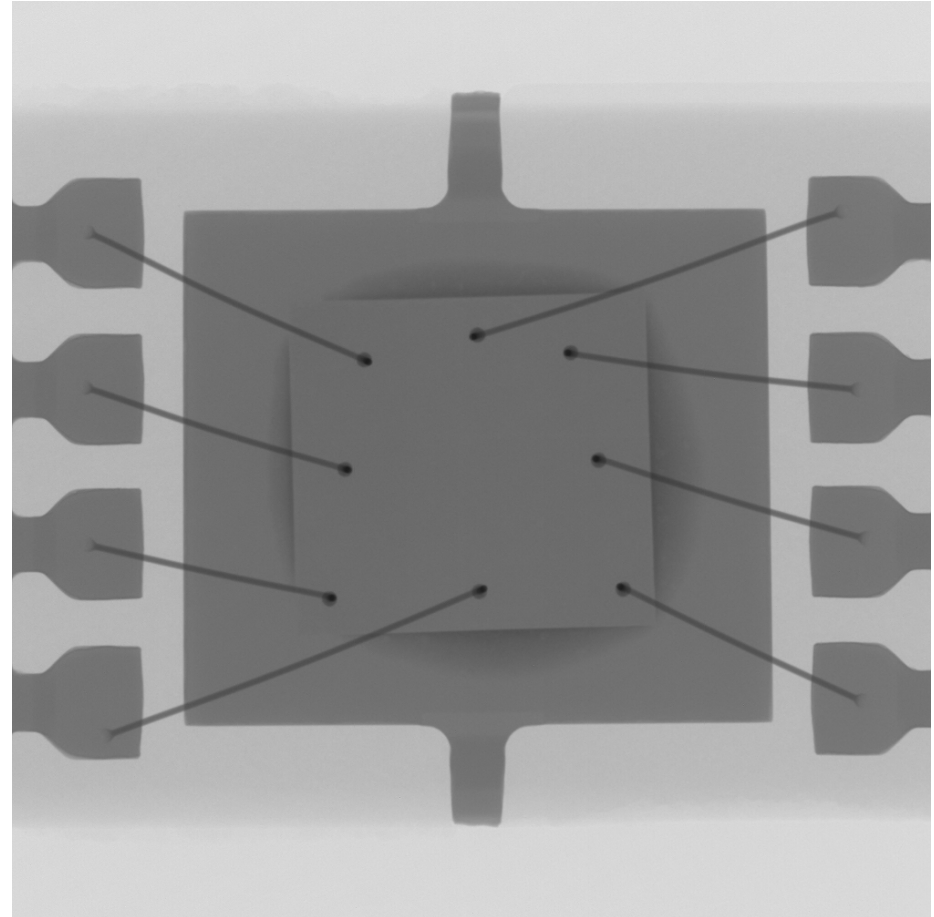
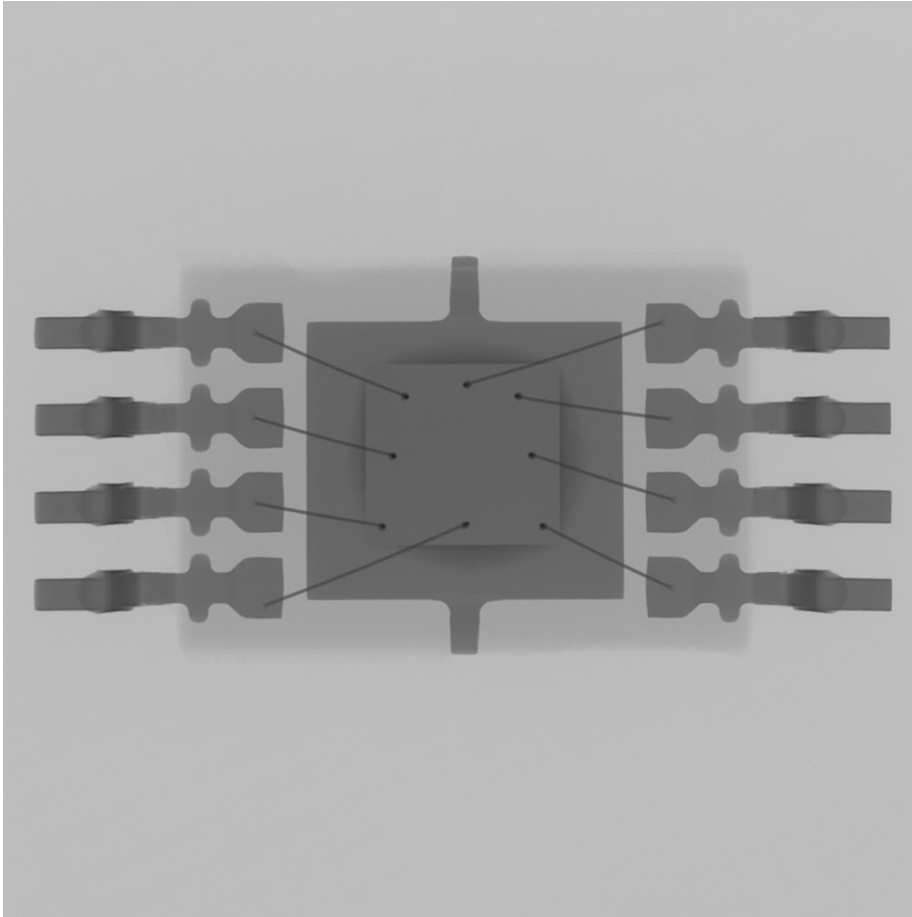
A社



B社

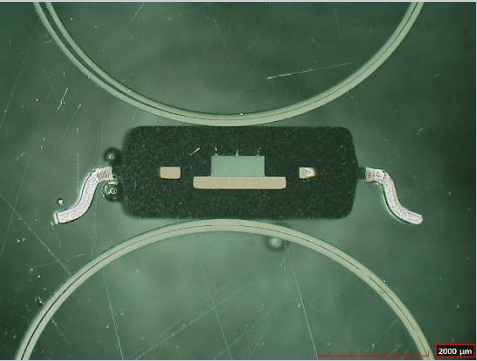
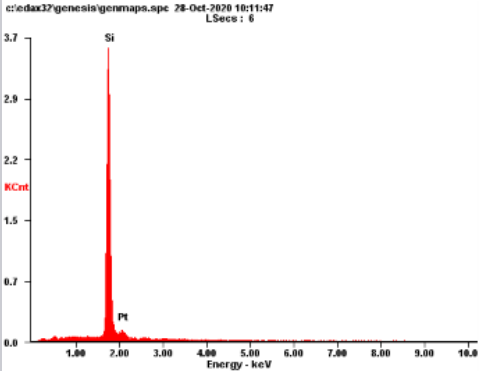
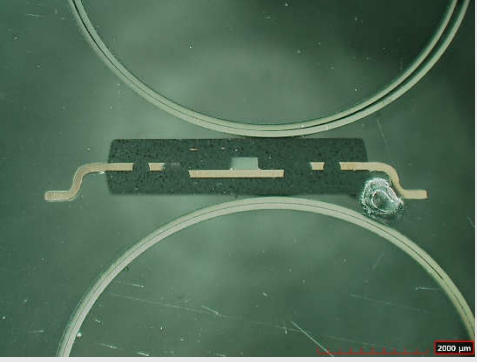
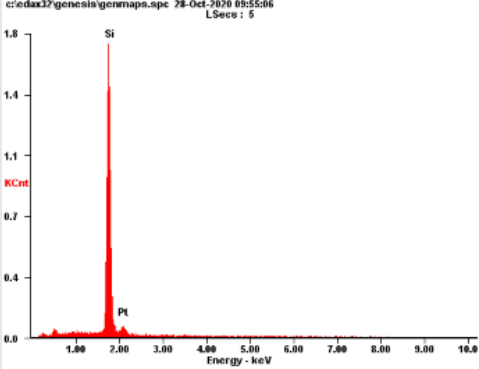
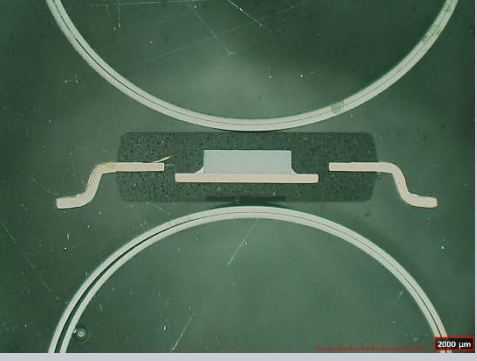
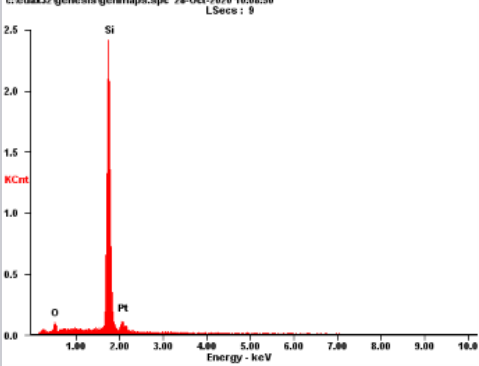


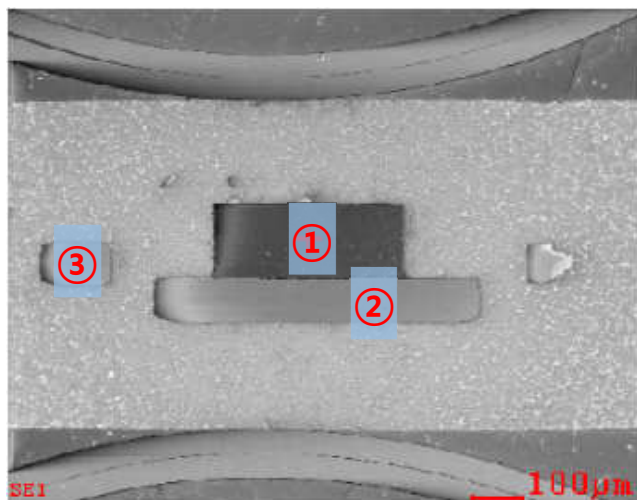
C社



III. SEM analyses

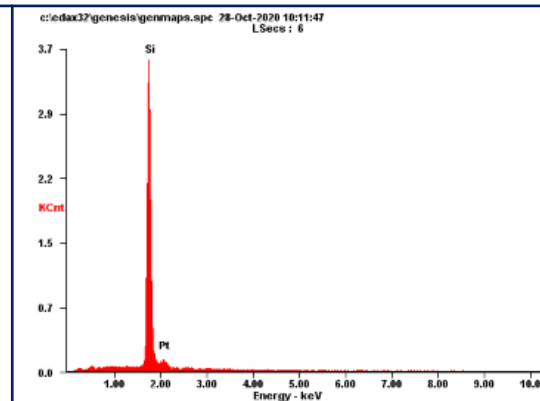


Specimen	SEM analyses														
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Pt	14.84	02.45													
B		<table border="1"> <thead> <tr> <th>Element</th> <th>Wt%</th> <th>At%</th> </tr> </thead> <tbody> <tr> <td>Si</td> <td>84.31</td> <td>97.39</td> </tr> <tr> <td>Pt</td> <td>15.69</td> <td>02.61</td> </tr> </tbody> </table>	Element	Wt%	At%	Si	84.31	97.39	Pt	15.69	02.61				
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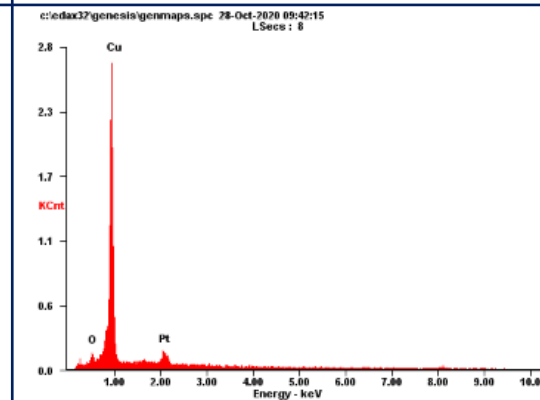
①

Element	Wt%	At%
Si	85.16	97.55
Pt	14.84	02.45



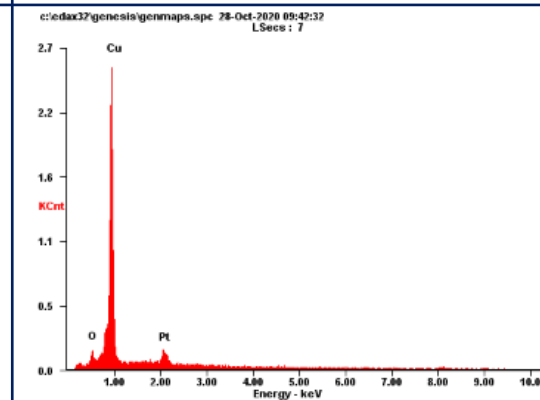
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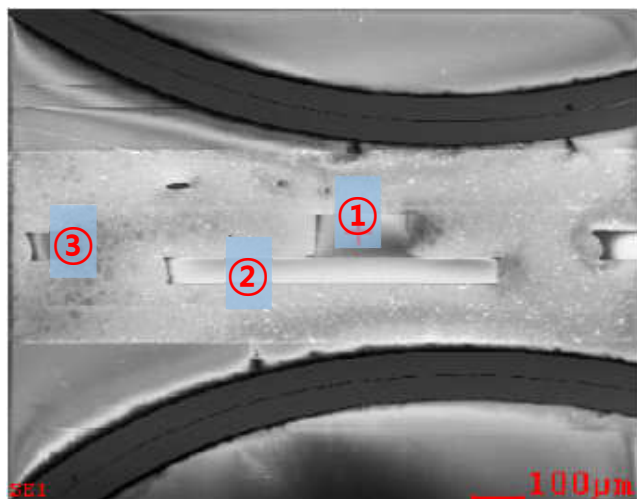
Element	Wt%	At%
O	02.36	09.51
Cu	85.03	86.32
Pt	12.61	04.17



③

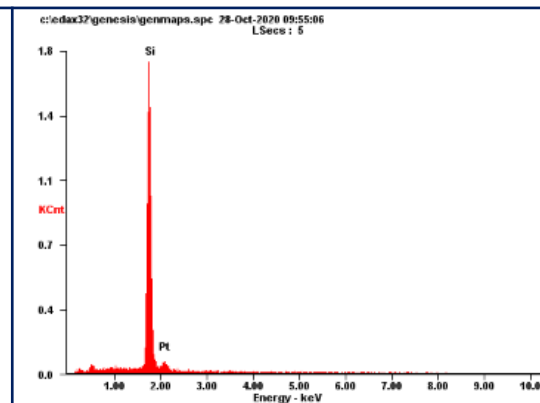
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O	02.77	11.06
Cu	84.17	84.66
Pt	13.06	04.28





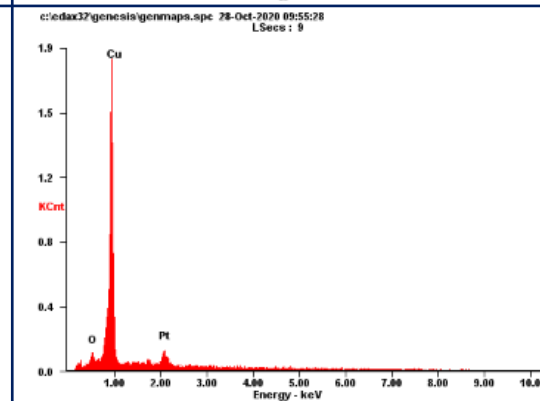
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Element	Wt%	At%
Si	84.31	97.39
Pt	15.69	02.61



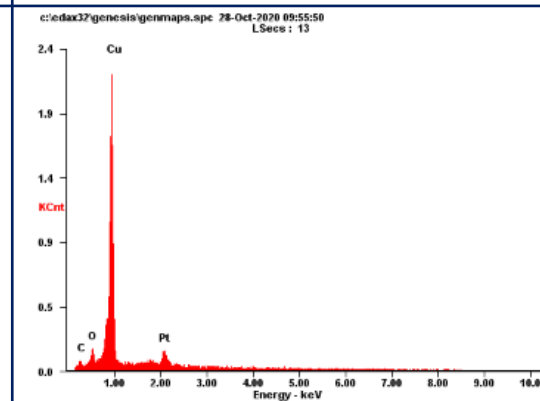
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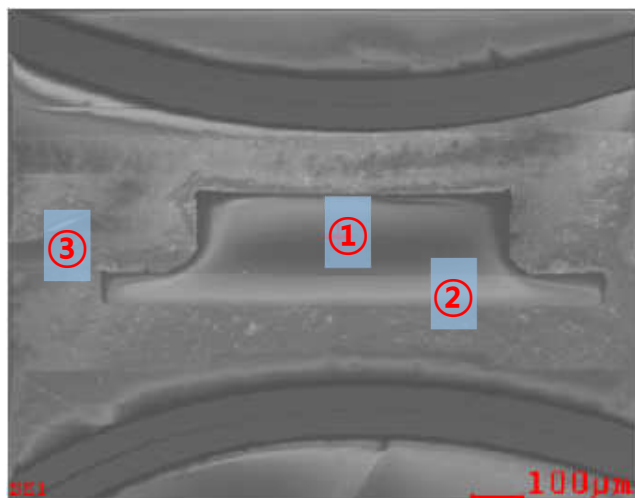
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Cu	84.47	86.55
Pt	13.32	04.44



③

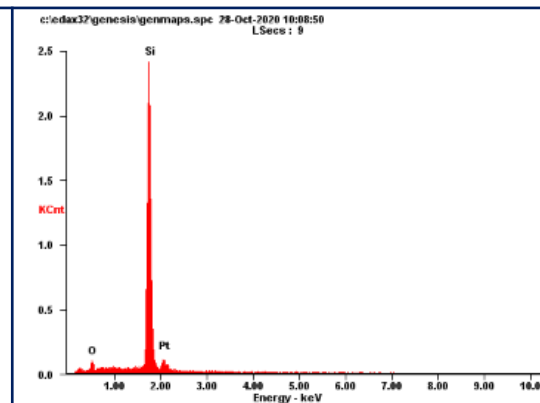
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O	04.74	14.12
Cu	77.00	57.83
Pt	11.94	02.92





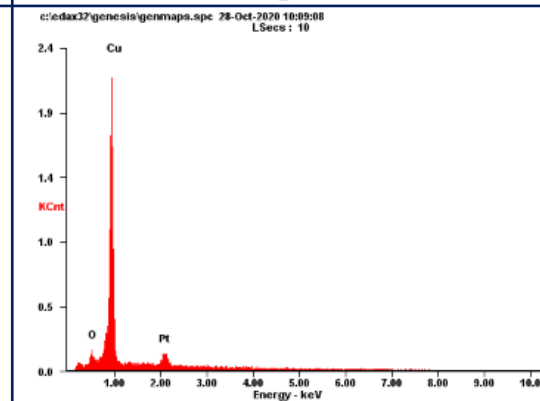
①

Element	Wt%	At%
O	05.38	10.22
Si	81.10	87.68
Pt	13.52	02.10



②

Element	Wt%	At%
O	03.33	13.09
Cu	83.53	82.68
Pt	13.14	04.24



③

Element	Wt%	At%
C	07.90	28.98
O	06.22	17.12
Cu	73.81	51.18
Pt	12.08	02.73

