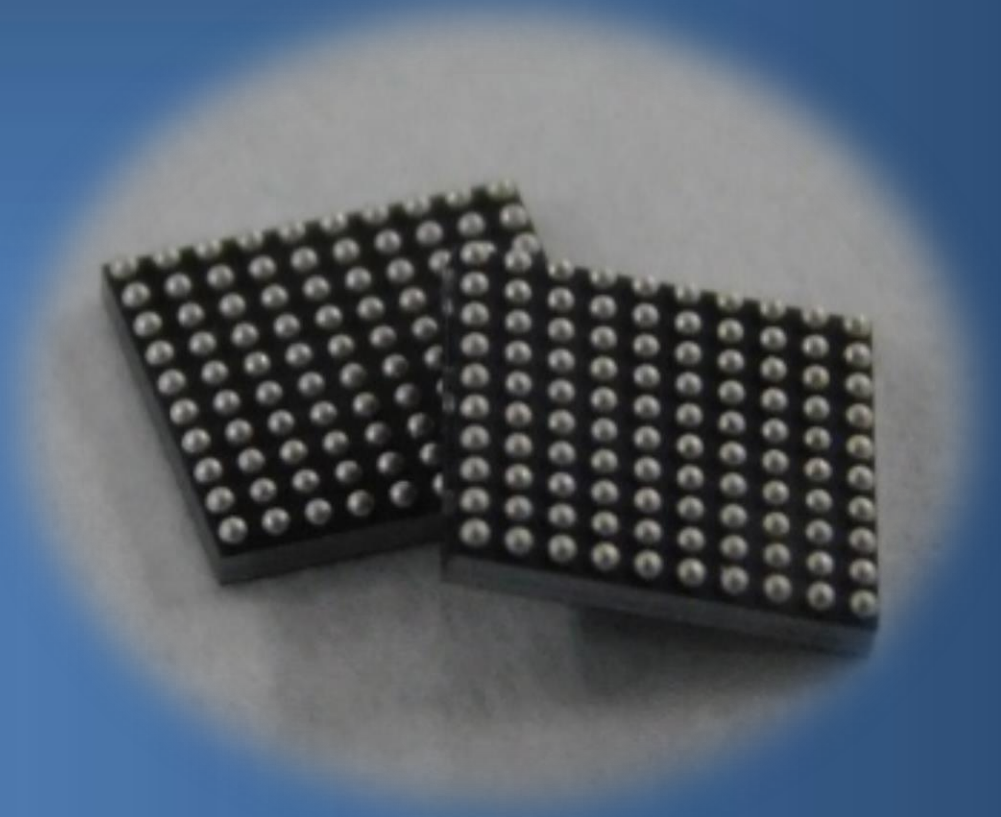
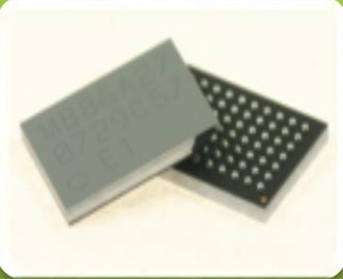


Oume Electronics Technology profile

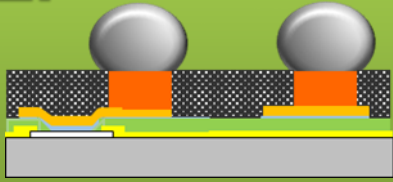


Oume Electronics CO.,LTD

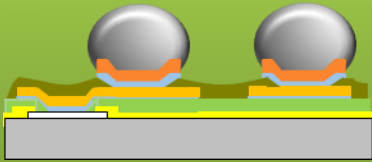
Production Line-up




WLP



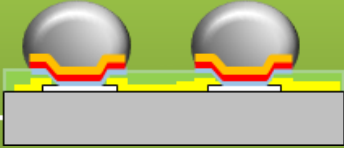
Cu POST type
6, 8, 12 inches



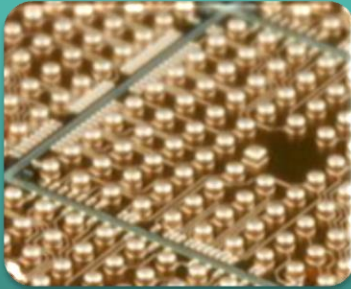
U (UBM) type
6, 8 inches



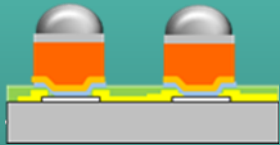
EWLP
6, 8, 12 inches




Solder ball on Al pad
8 inches



Bump for Flip Chip Package



Cu Pillar
8, 12 inches

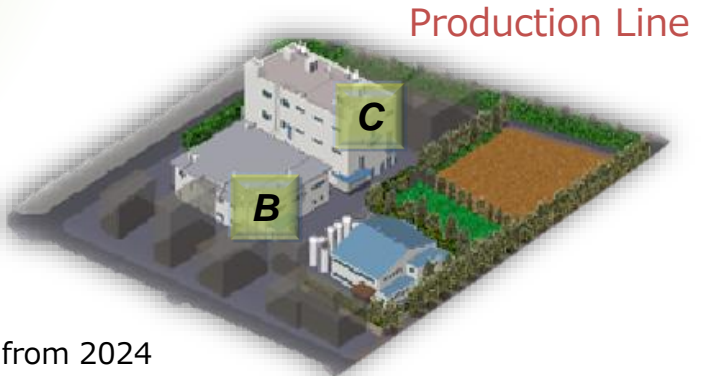


Micro Solder Bump
8, 12 inches

Oume Factory			
B Bldg	1F	All size DBG, Dicing , 12inch Solder Ball forming	
	3F	6,8inch WLP Solder Ball and Solder Bump forming	
C Bldg	2F	Wafer In-Out 6, 8 inch WLP RDL Process	12inch Solder Bump
	1F	12inch RDL Process	All size Stepper

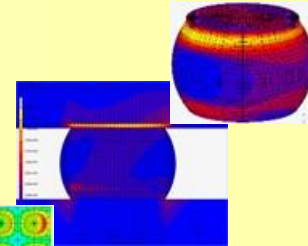
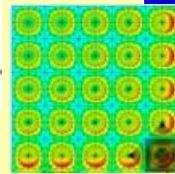
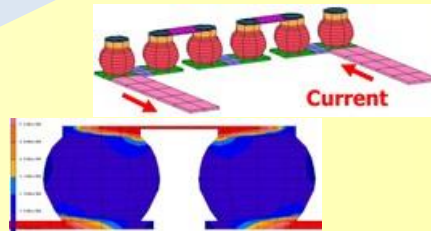
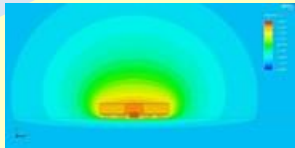
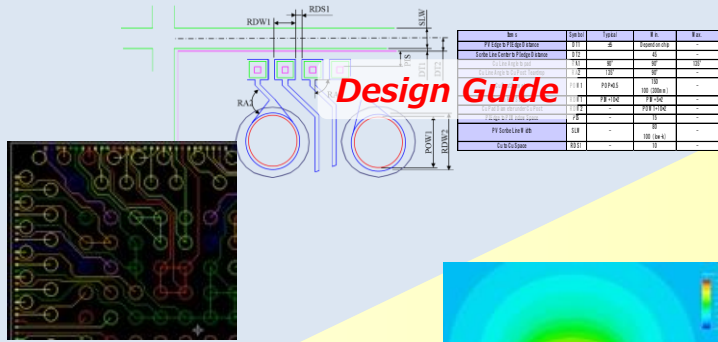
		Capacity
6,8 inches	WLP	18k wfs/M
	BUMP	*1.5k wfs/M
12 inches	WLP	4.5k wfs/M
	BUMP	2.0k wfs/M

*To be upgraded to 3K wafers/month from 2024



Design

- We have our Design Guide for each package.
- Suggest the optimal wiring layout.
- Select the optimal material.
(For constraint of temperature or magnetic.)

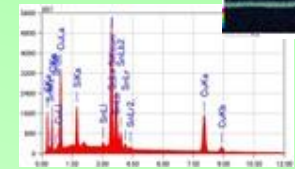
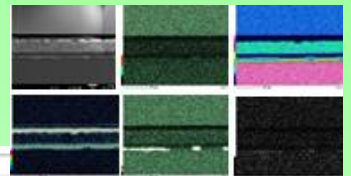


Simulation

- Current Simulation
- Thermal Resistance Simulation
- Structural Simulation
↳ Stress, Distortion, Warpage...

Outline

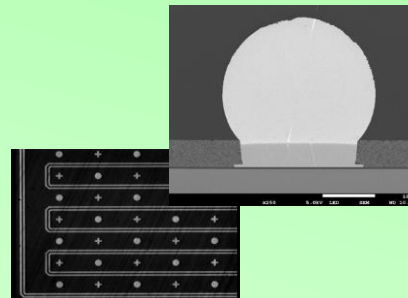
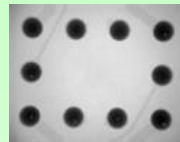
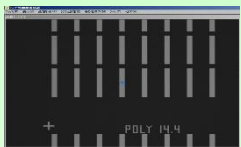
- Reliability Test (PCT/HTS/TC/THB/HAST...)
- Cross Sectional Observation
- FE-SEM Observation
- SAT Observation
- X-ray Observation
- EPMA Analysis



Analysis

Inline

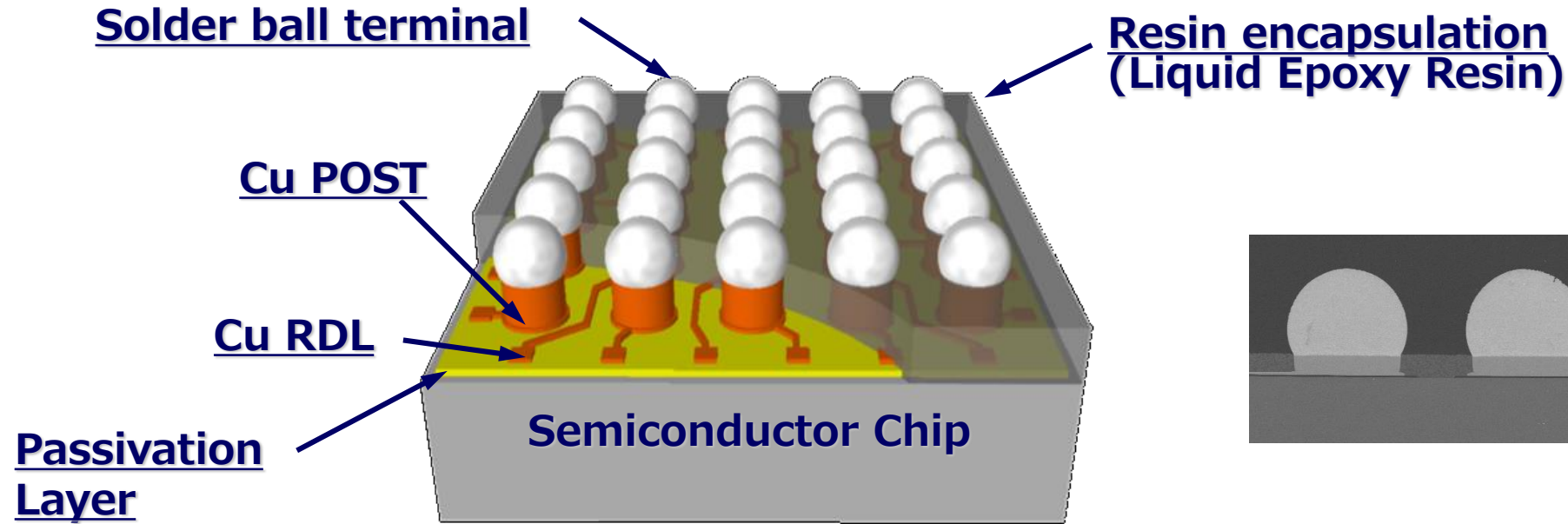
- Automated Optical Inspection
- Terminal Shear Strength Test
- X-lays Void Inspection



Customer service

Equipment	Model, Vendor	Sample size
Cross section polisher	ISPP-1000A / Ikegami IB-19500CP / JEOL	8mm x 8mm
FE-SEM	JXA-7100F / JEOL	8inch wafer
EPMA	JXA-8500F / JEOL	25.5mmx25.5mmx20mmH x9pcs
Infrared microscope	MX-61-IR / Olympus	12inch wafer
Grinding Machine	Tegrapol 15 / Struers	2cm x 2cm
Laser scanning microscope	OLS 1200 / Olympus	8inch wafer
Micro-focus X-ray	XD7600 / DAGE	12inch wafer (one equipment)
Ultrasonic test equipment	QUANTUM-350H / Sonix	12inch wafer
Fluorescent X-rays	3640 / Rigaku	8inch wafer
Fluorescent X-rays	SIA5200 / SII	8inch wafer

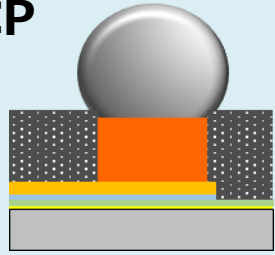
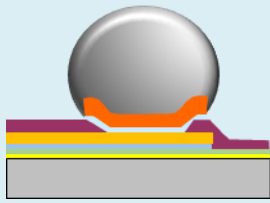
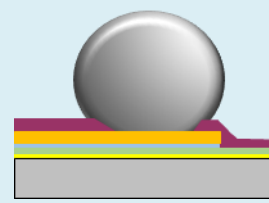
Cu POST WLP Construction and Characteristic



Characteristic (Summary)

- ▶ ① High reliability.
- ▶ ② High current capacity *Under Development*
- ▶ ③ Reduce chipping on Circuit side (Protected by resin)
- ▶ ④ Improve quality for low-k
- ▶ ⑤ Low temperature process
(Damage reduction for insulation film)

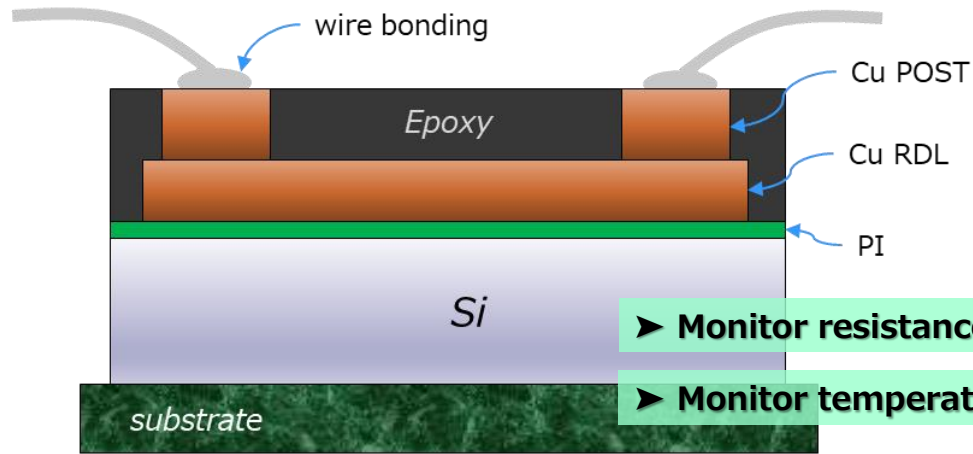
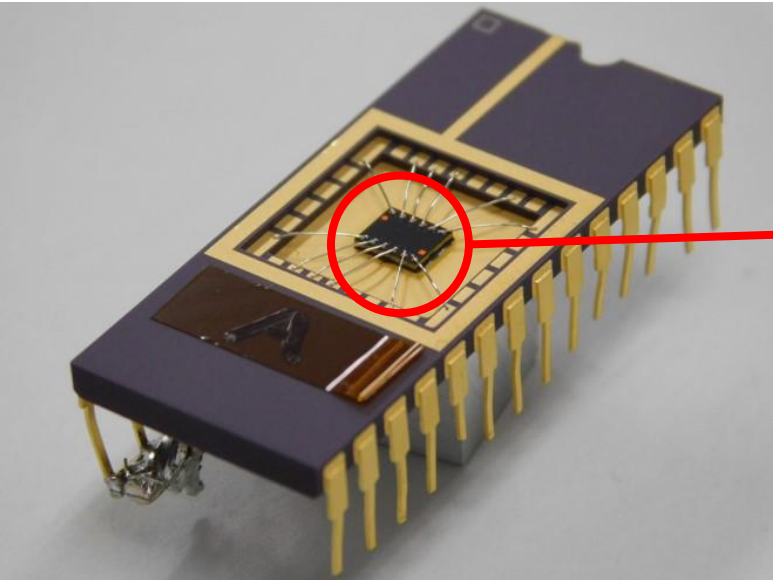
Cu POST WLP ① High reliability

Reliability test results	JEDEC Standard	CP 	U 	V 
	Criteria			
Reflow MSL Level1 (85°C85% 168Hr ;Reflow T _p 260°Cx 3times)	Reflow3time S	MSL Level1 (Reflow×10) Pass	MSL Level1 (Reflow×10) Pass	MSL Level1 (Reflow×10) Pass
HTS 150°C	1,000H	2,000H Pass	1,000H Pass	1,000H Pass
PCT 121°C,100%	A:24H D:168H F:336H	500H Pass	168H Pass	168H Pass
T/C -65~150°C		1,000cyc Pass	1,000cyc Pass	1,000cyc Pass
HAST 130°C85% 3.5V	96H	120H Pass	96H Pass	96H Pass
THB 85°C85% 3.5V	TYP 1,000H	2,000H Pass	1,000H Pass	1,000H Pass

* Oume evaluation result

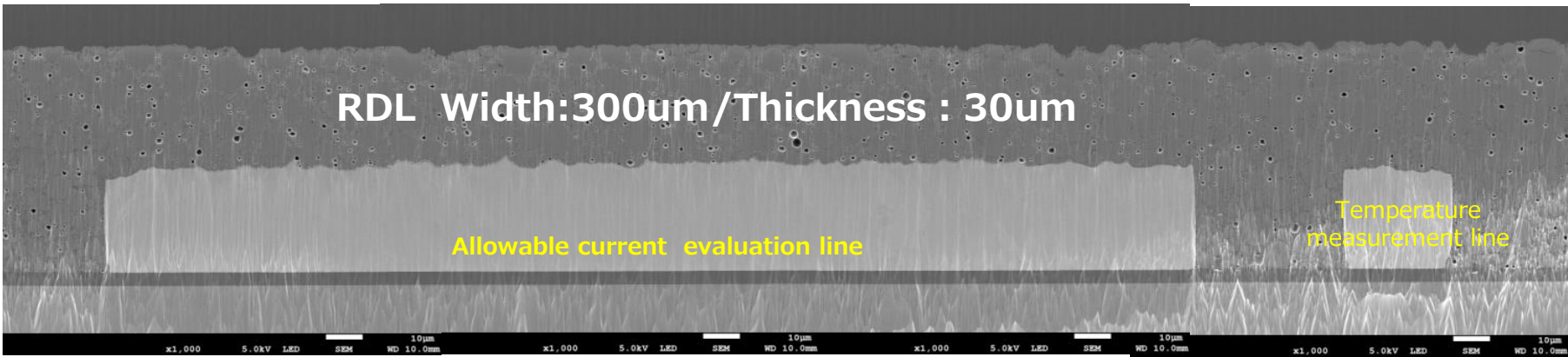
Cu POST WLP ② High current capacity

Under Development



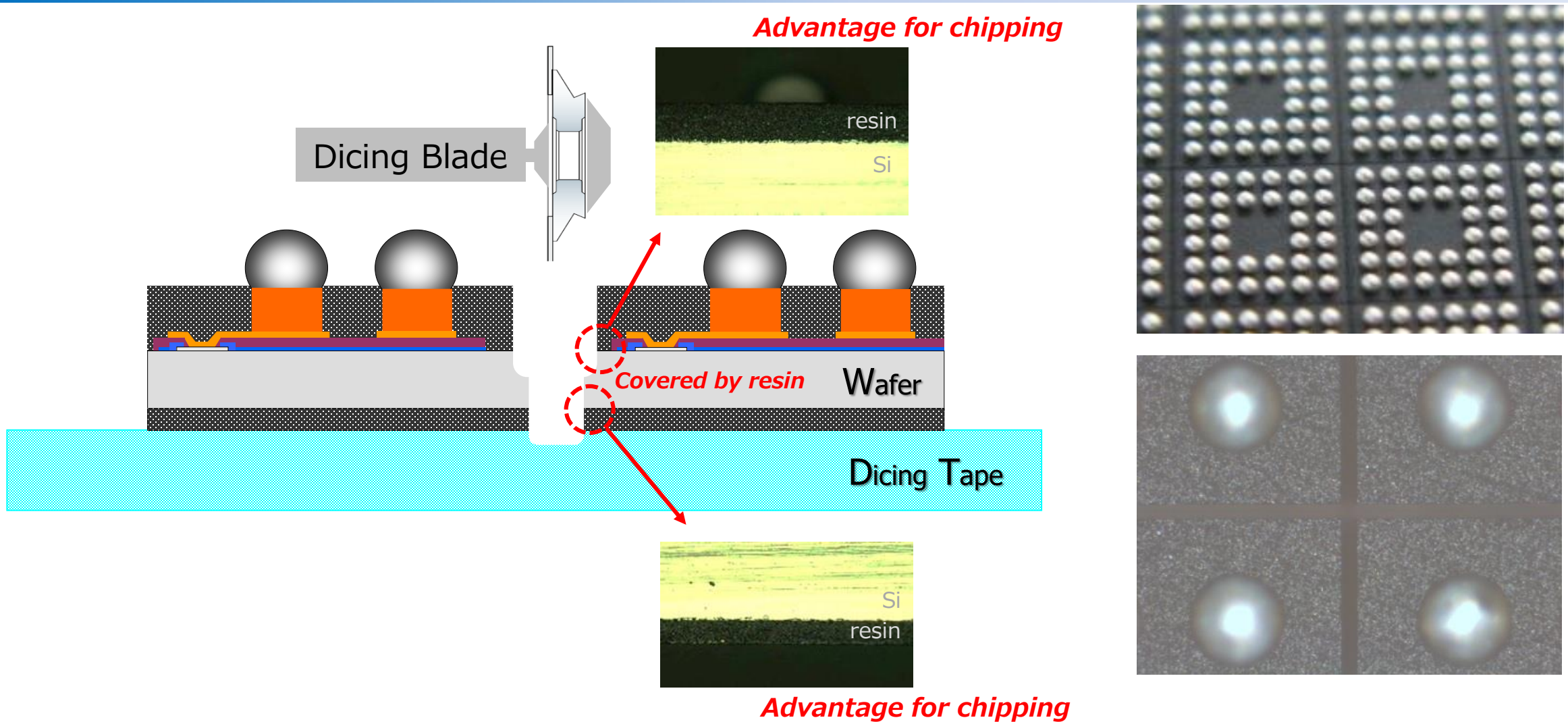
- ▶ Monitor resistance with measurement line
- ▶ Monitor temperature with 4-terminal measurement

Vertical structure



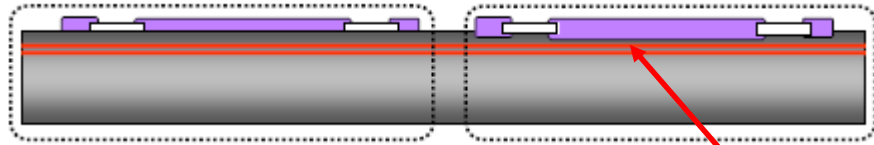
If RDL is Width: 300um/Thickness: 30um, even if the current is 10A, there is no fusing of the wiring. Also, there is no abnormality in the resin covering the wiring. It is the strength of our CP type that we can make wiring of this thickness.

Cu POST WLP ③ Reduce chipping on Circuit side



Since the resin covers the electrical circuit There is no chipping in the dicing process.
As an option, the back side can also be formed with resin.

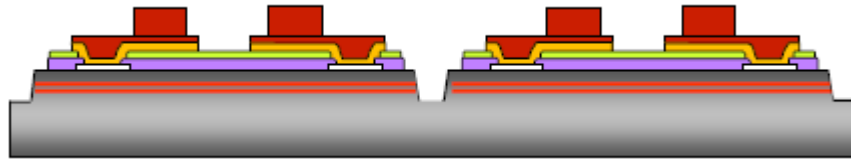
Cu POST WLP ④ Improve quality for low-k



Incoming

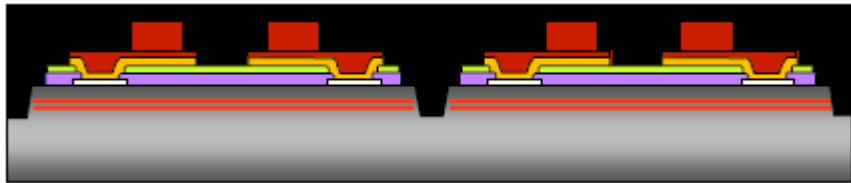
 : 1 Chip

Low-k layer

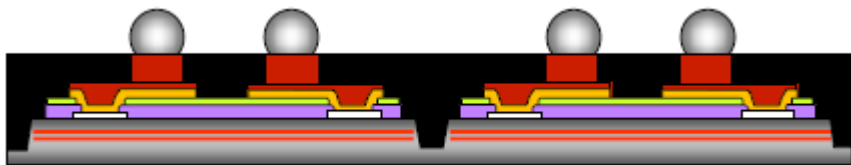


Laser grooving

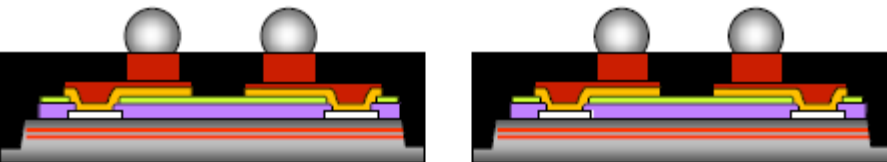
(The figure shows that after Ti etching.)



Encapsulation Resin

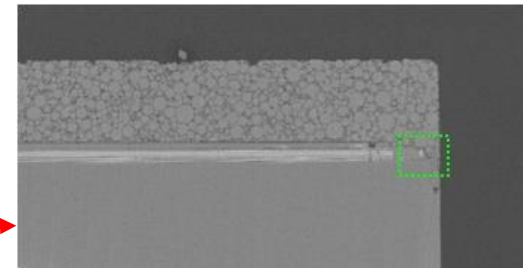


Solder Ball Attach



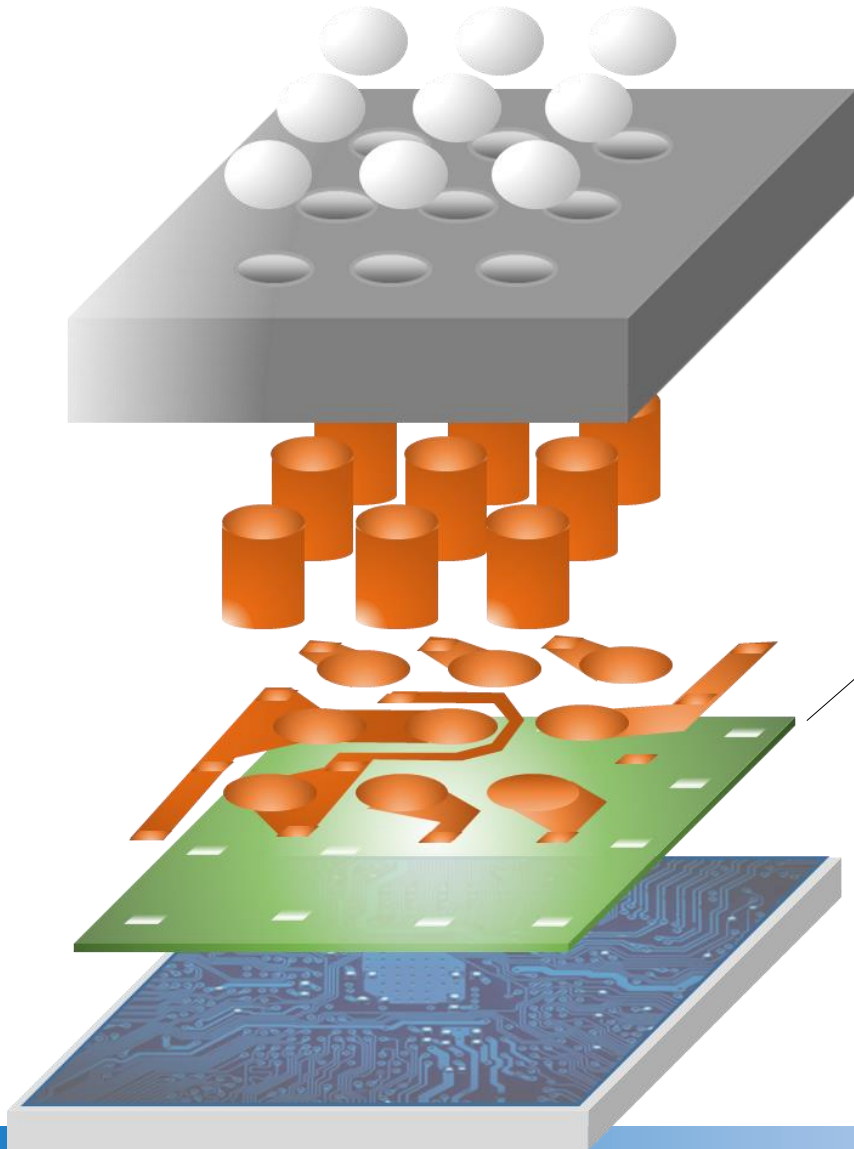
Dicing

Our CP type,
The low-k side wall is covered
with resin,
so there is no damage to the
low-k layer due to external
factors.



Cu POST WLP ⑤ Low temperature process

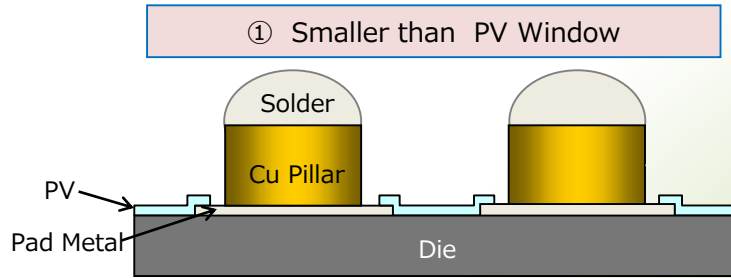
Cu POST型WLP



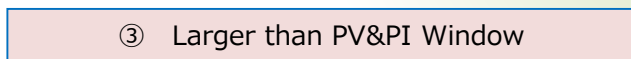
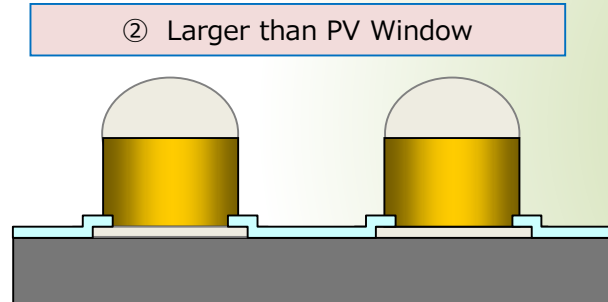
Insulating film curing is the most heat-intensive process for our CP type. It can be lowered to **250°C**.

Cu Pillar Design Guide

Cu Pillar on Pad (Cu Pillar Direct on Pad)

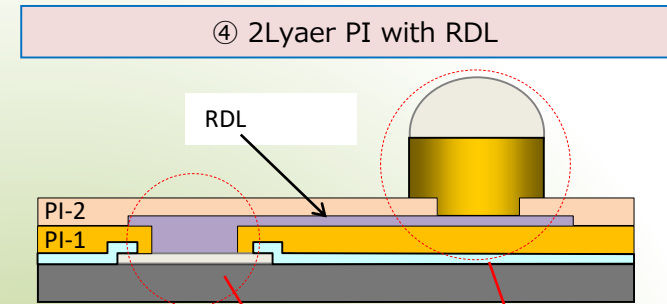


* PV :
Passivation

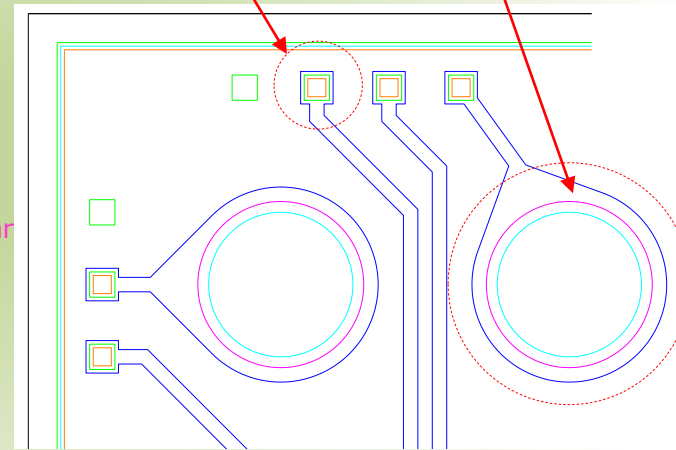


* PI : Polyimide Insulation

Cu Pillar with RDL (Cu Pillar with RDL)

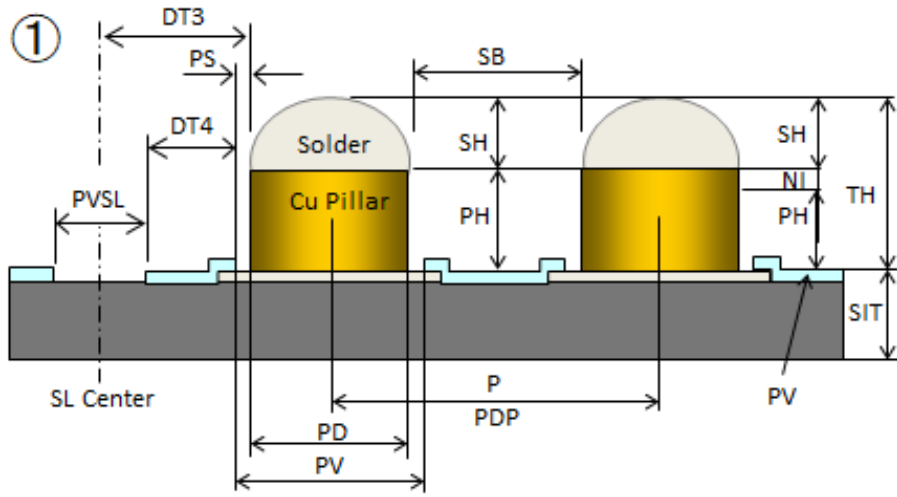


PV
PI-1
RDL
PI-2
Cu Pillar



Items	6" , 8" Wafer	12" Wafer
Cu Pillar on Pad	Available	Available
Cu Pillar with RDL	8" available, 6" Further discussion needed	Further discussion needed
Pillar Structure	Cu + (Ni +) Sn-Ag	Cu + (Ni +) Sn-Ag
Seed Layer Materials	Ti+Cu	Ti+Cu
Solder Bump Materials	Sn-2.5Ag	Sn-2.3Ag
Wafer Edge outside Effective Area	4mm	3mm (4mm Depend on spec)

Cu Pillar Design Guide



(Cu Pillar Size Example Table)

(um)

Wafer Size	Cu Pillar Pitch P	Cu Pillar Diameter PD	Pillar Space SB	Solder Height SH (max=PD/2)	Cu Height PH	Pillar Total Height TH (max)
6" , 8"	75	40	35	20.0	35.0	55.0
	80	40	40	20.0	35.0	55.0
	90	45	45	22.0	35.0	57.0
	100	50	50	25.0	58.0	83.0
	150	75	75	37.0	50.0	87.0
	200	100	100	50.0	86.0	136.0
12"	75	40	35	20.0	25.0	45.0
	80	40	40	20.0	25.0	45.0
	90	45	45	22.0	25.0	47.0
	100	50	50	25.0	23.0	48.0
	150	75	75	37.0	15.0	52.0
	200	100	100	46.0	10.0	56.0

※Example Case of : $PD(\text{typ}) \approx P/2$, $SH \approx \text{max}$

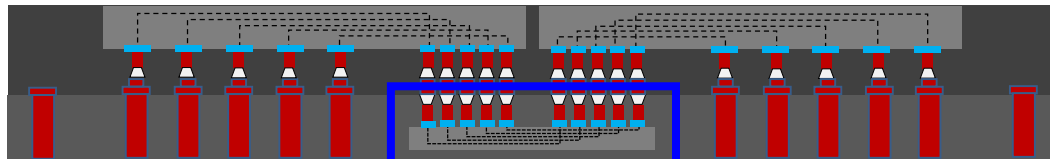
※The detailed design will be in consultation with the customer.

※ For $P < 75$, $PD < 40$, need OEL Confirmation

WLP technology Map

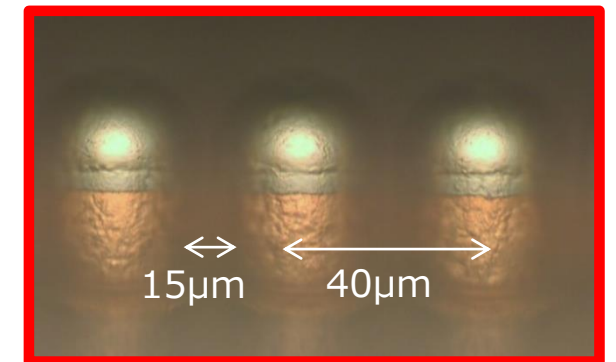
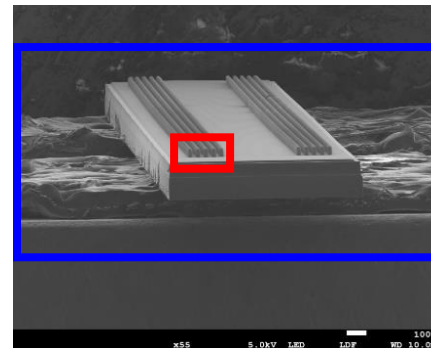
Minimum size (unit μm)	Cu Post type	UBM type	Cu pillar
Line & Space of RDL	8 / 8	8 / 8	8 / 8
Terminal pitch	150 ~	150 ~	40 ~
Terminal (Diameter)	90 ~	90 ~	25 ~
Body thickness	200 ~	200 ~	250 ~

Cu pillar



Bridge-Chip

under development



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