NAMICS

SECONDARY UNDERFILL

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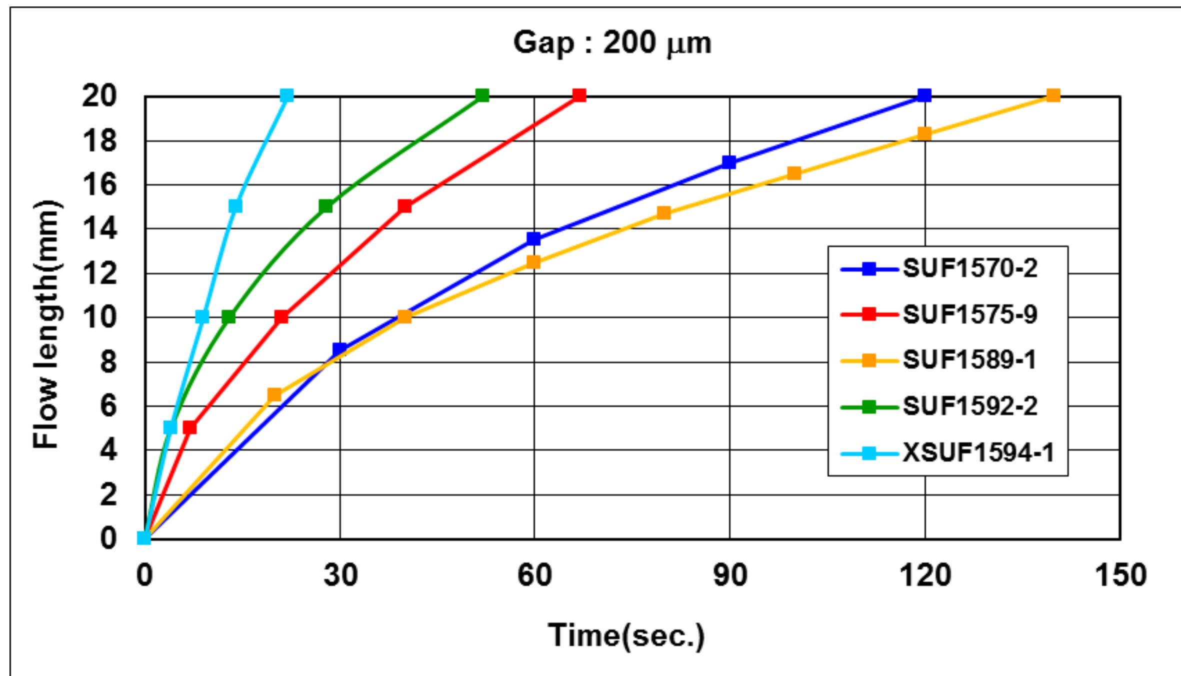
Why Secondary Underfill

- To increase the CSP / BGA package reliabilty for the following aspects:
  - Maximum Operation Temperature
  - Moisture Protection (Migration / Corrosion)
  - Temperature Cycle Loads
  - Vibration Loads
  - Drop Shock

CURRENT PRODUCTS

Type		Unit	XSUF1594-1	XSUF1570-2	SUF1575-9	Ohmcoat 1574	SUF1589-1	XSUF1589-19	SUF1592-2
			Reworkable, Fast Flow	High Reliability	High Productivity, Fast Flow, Quick Cure	High Reliability	Excellent Temperature and Moisture Resistance	Excellent Temperature and Moisture Resistance	Excellent Resistance to High Temp. Reflow
Reflow Resistance			Yes	Yes	Yes	Yes	Yes	Yes	Yes
Filler Contents		wt %	20	55	30	55	70	67	60
Filler Size	Mean	µm	2	2	0,6	2	5	3	0,6
	Max.	µm	10	10	3	10	25	25	3
Viscosity @ 25°C		Pa.s	0,7	40	4	8	10	10	10
Gel Time @150°C		Sec.			15	30	160	160	160
Tg (TMA)		°C	105	135	100	130	120	110	120
CTE	α 1	ppm / °K	60	32	50	45	23	22	35
	α 2	ppm / °K	180	100	150	130	80	87	100
Bending Modulus		GPa	4	8	5	3	13	10	10
Adhesion Strength		N			≥ 220	≥ 220	≥ 220	≥ 220	≥ 220
Curing	80°C	Min.			120				
	100°C	Min.			60	100	100		
	120°C	Min.			5	20	20		
	150°C	Min.	15	20	1	3	3	30	120
Substrate Temperature Recommended		°C	25 - 90	50 - 70	40 - 60	40 - 70	50 - 70	50 - 70	90 - 110
Pot Life (25°C)		Hrs.		24	24	24	24	24	24
Storage		°C		< -20°C	< -20°C	< -20°C	< -20°C	< -20°C	< -40°C

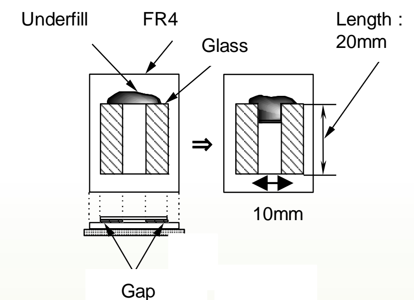
FLOW RATES



Substrate Temp.:

- SUF1570-2: 70C
- SUF1575-9: 60C
- SUF1589-1: 70C
- SUF1592-2: 110C
- XSUF1594-1: 90C

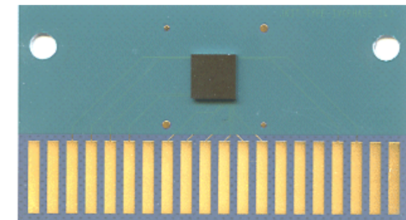
Test Device



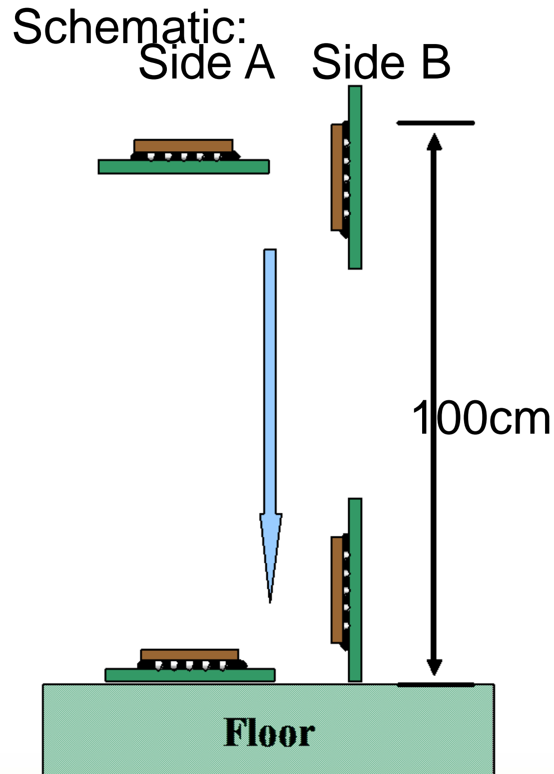
RELIABILITY

➢ Test Vehicle Package Configuration (WLCSP)

- ➢ Die Size: 6 mm x 6 mm x 0.725 mm(t)
- ➢ Passivation: Polyimide
- ➢ Solder Balls: Sn-3.0 Ag-0.5 Cu
- ➢ Number of Bumps: 288 (Full Area)
- ➢ Ball Pitch: 300 μm
- ➢ Ball Height: 140 μm
- ➢ Substrate: High-Tg FR-4
- ➢ Substrate Size: 52.55 mm x 30.0 mm x 0.73 mm(t)



DROP TEST



FIT-S1800 (Hitachi Technologies and Services,Ltd)

	Test result	
	Side A	Side B
Without Underfill	Fail at 1st	Fail at 1st
SUF1570-2	Pass 500 times	Pass 500 times
SUF1575-9	Pass 500 times	Pass 500 times
SUF1589-1	Pass 500 times	Pass 500 times
SUF1592-2	Pass 500 times	Pass 500 times
XSUF1594-1	Pass 500 times	Pass 500 times

Failures: over 10 % Electrical Resistance Change

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TCT: -40 / +85°C

Cycle	300	500	1000
Without Underfill	1 / 3	3 / 3	–
SUF1570-2	0 / 10	0 / 10	0 / 10
SUF1575-9	0 / 10	0 / 10	0 / 10
SUF1589-1	0 / 10	0 / 10	0 / 10
SUF1592-2	0 / 10	0 / 10	0 / 10
XSUF1594-1	0 / 10	0 / 10	0 / 10

Time Interval:
15 + 15 Min.

Test conditions are according to JEDEC Standard, Thermal Cycling, Conditions N Air to Air Thermal Cycling.

Fail / Total Test Vehicles

Failures : over 10 % electrical resistance change

All Materials passed 1000 cycles in TCT

NAMICS

TCT: -55 / +125°C

	Filler contents [wt%]	C.T.E. [ppm/C]	Modulus [GPa]	Cycle				
				300	500	1000	1500	2000
Without Uunderfill				3 / 3	–	–	–	–
SUF1570-2	55	32	8	0 / 10	0 / 10	0 / 10	0 / 10	0 / 10
SUF1575-9	30	50	5	0 / 10	0 / 10	0 / 10	3 / 10	8 / 10
SUF1589-1	70	23	13	0 / 10	0 / 10	0 / 10	0 / 10	0 / 10
SUF1592-2	60	35	10	0 / 10	0 / 10	0 / 10	0 / 10	0 / 10

Time Interval: 30 + 30 Min.

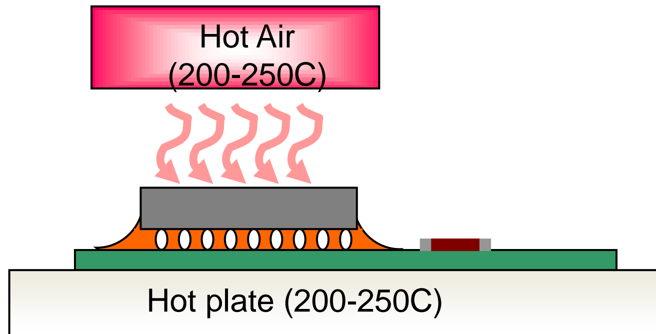
Test conditions are according to JEDEC Standard, Thermal Cycling, Conditions B Air to air thermal cycling.

Fail / Total Test Vehicles

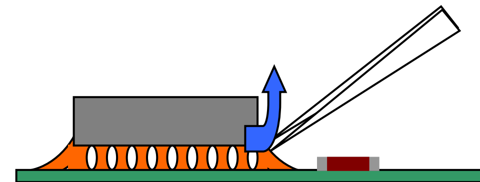
Failures : over 10 % electrical resistance change

Only High Reliability Materials Pass

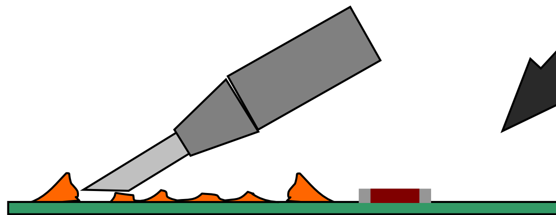
REWORKING SUF1594-1



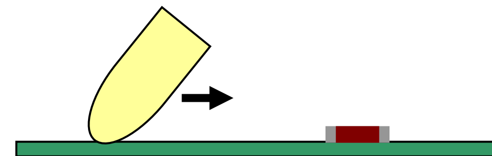
1.) Heat the CSP with hot air or hot plate up to the melting point of the soldering balls.



2.) Lightly scrape the fillet of the encapsulant material with tweezers and insert their points between the CSP and the board. You can remove the CSP by lifting up the inserted tweezers.

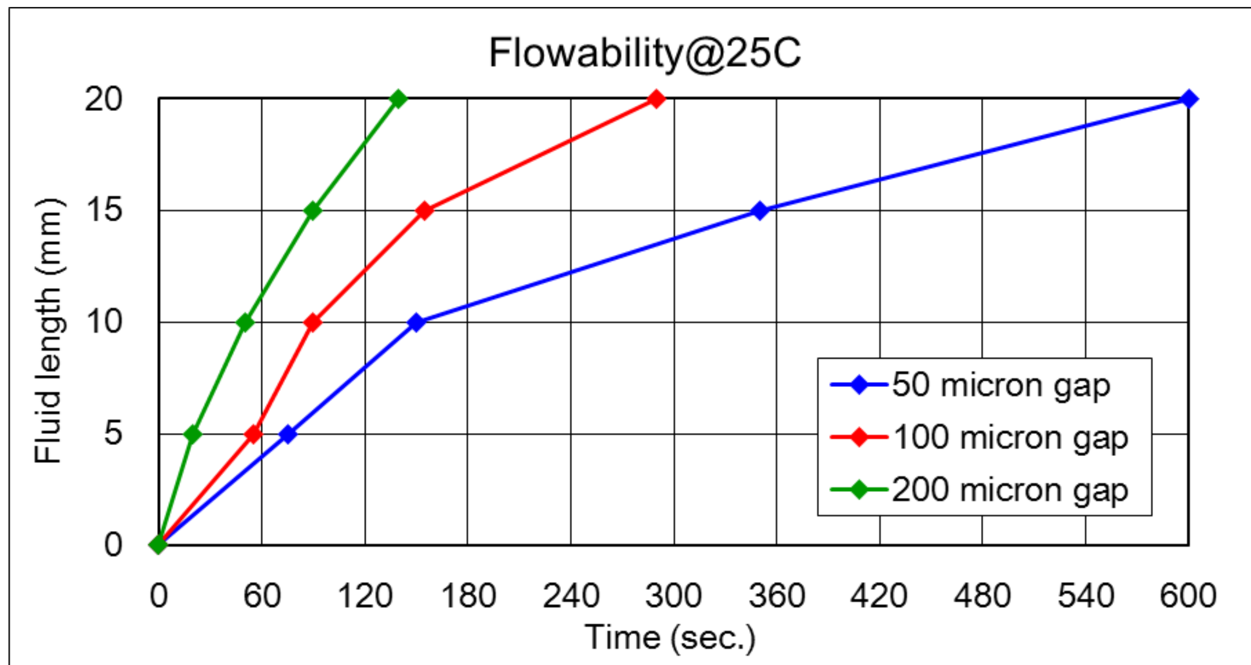


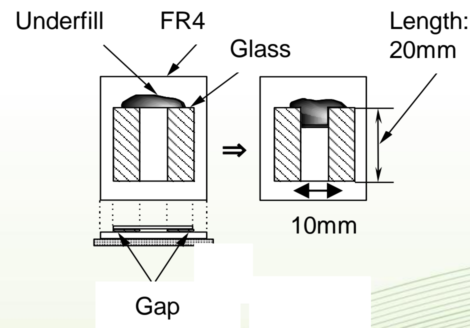
3.) Scrape the remaining encapsulant material off the board with a soldering iron which has a thin point like a paperknife. At this time, the encapsulant material should be sufficiently heated.

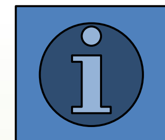


4.) Wipe the board with a utensil soaked with a cleansing solvent such as acetone.

FLOW OF SUF1594-1 @ 25°C







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Thank you