

Data package of ATB-F100E series

FOW Film Adhesive

March 2011

Film Team



Excellence is our Passion

DDAF Adhesives

Base Die (Curable)

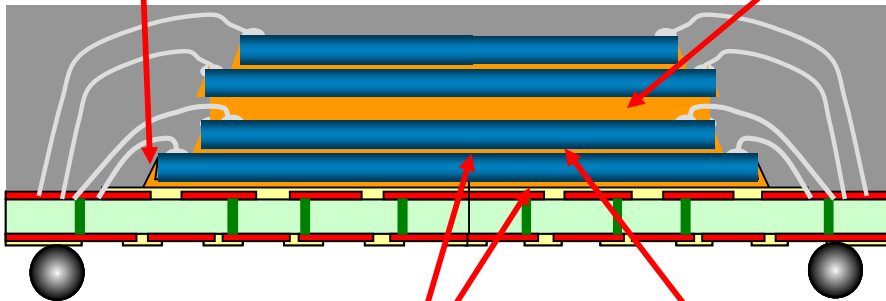
ATB-100series, CDF20017-32C

- Good warpage
- L2/260C,
- Excellent flow ability on substrate

FOW (Same Die size stack)

ATB-F100E series

- L2/260C
- Low CTE
- Good wire penetration
- Excellent thin die pickup



Base Die + Die to Die (Skip Cure)

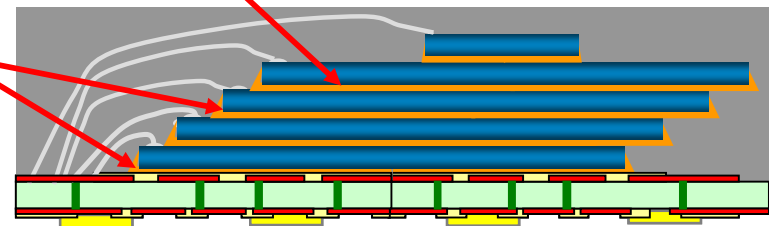
ATB-100US1, ATB-100US2

- Excellent thin die pickup (<2mils),
- L2/260C,
- Thermal budget up to 4hrs @175C
- Small die pick up (2x2mm)
- 5um thickness capable

Die to Die (Curable)

ATB-100series

- L2/260C
- Good workability



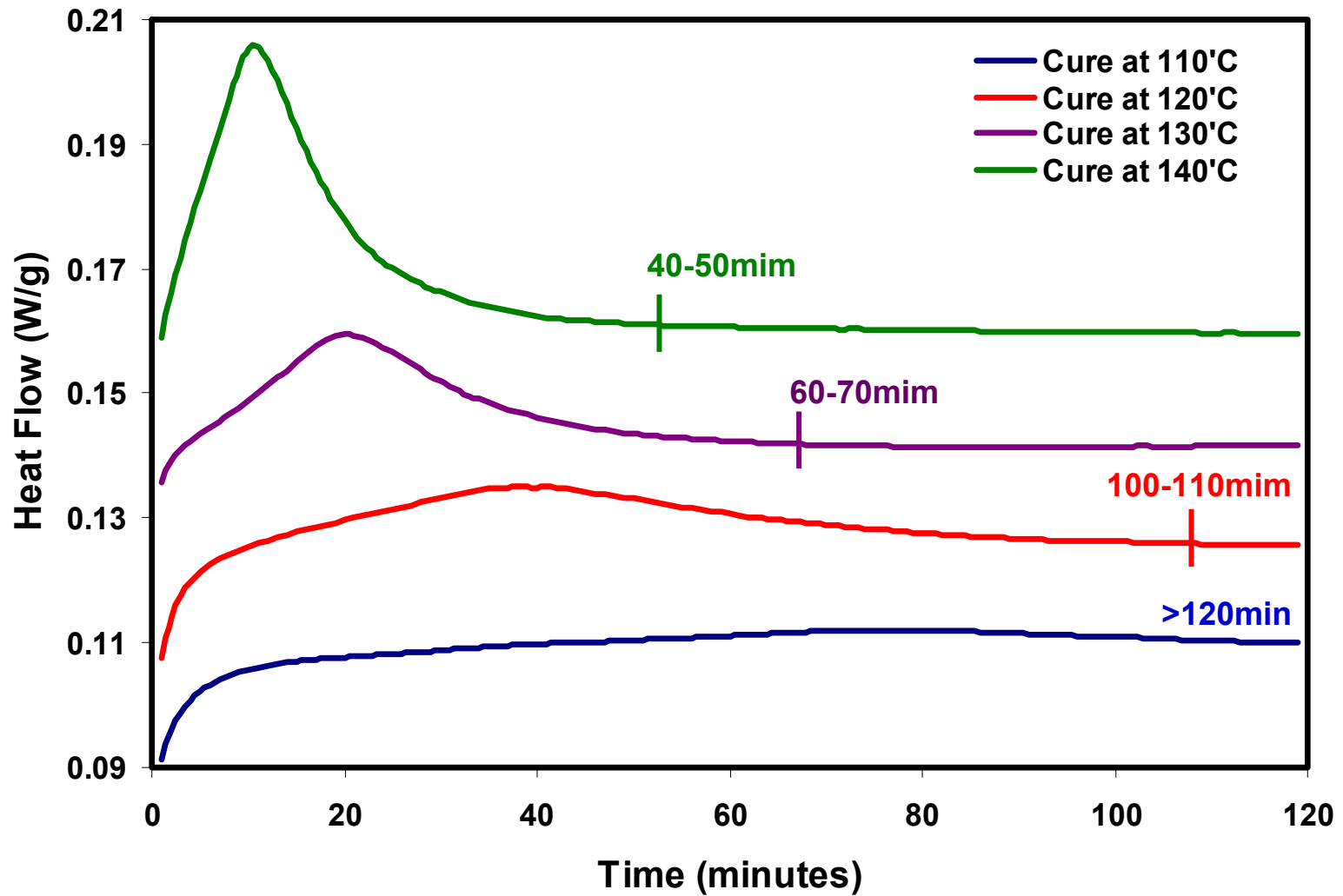
Design concept of ATB-F100E

- **Introduction**
 - **Single layer die attach film**
 - **Epoxy based formulation**
 - **Compatible with non UV and UV dicing tape**
 - **Designed to provide excellent b-HAST performance**
 - **Fast cure, 1hr cure at 130°C or less than 1 hr at >140°C**
 - **Low CTE**
- **Features**
 - **Excellent workability**
 - **Burr-free**
 - **No double die pick up, no tearing**
 - **Excellent die pickup performance on UV D/T**
 - **High thermo-mechanical properties**
 - **Low CTE**
 - **Low moisture absorption**
 - **High modulus**
 - **Excellent flow at die attach temperature**
 - **Fast cure (1hr cure at 130°C)**
 - **Excellent wetting around wires and gap filling**
 - **Excellent MRT performance (L2/260°C)**

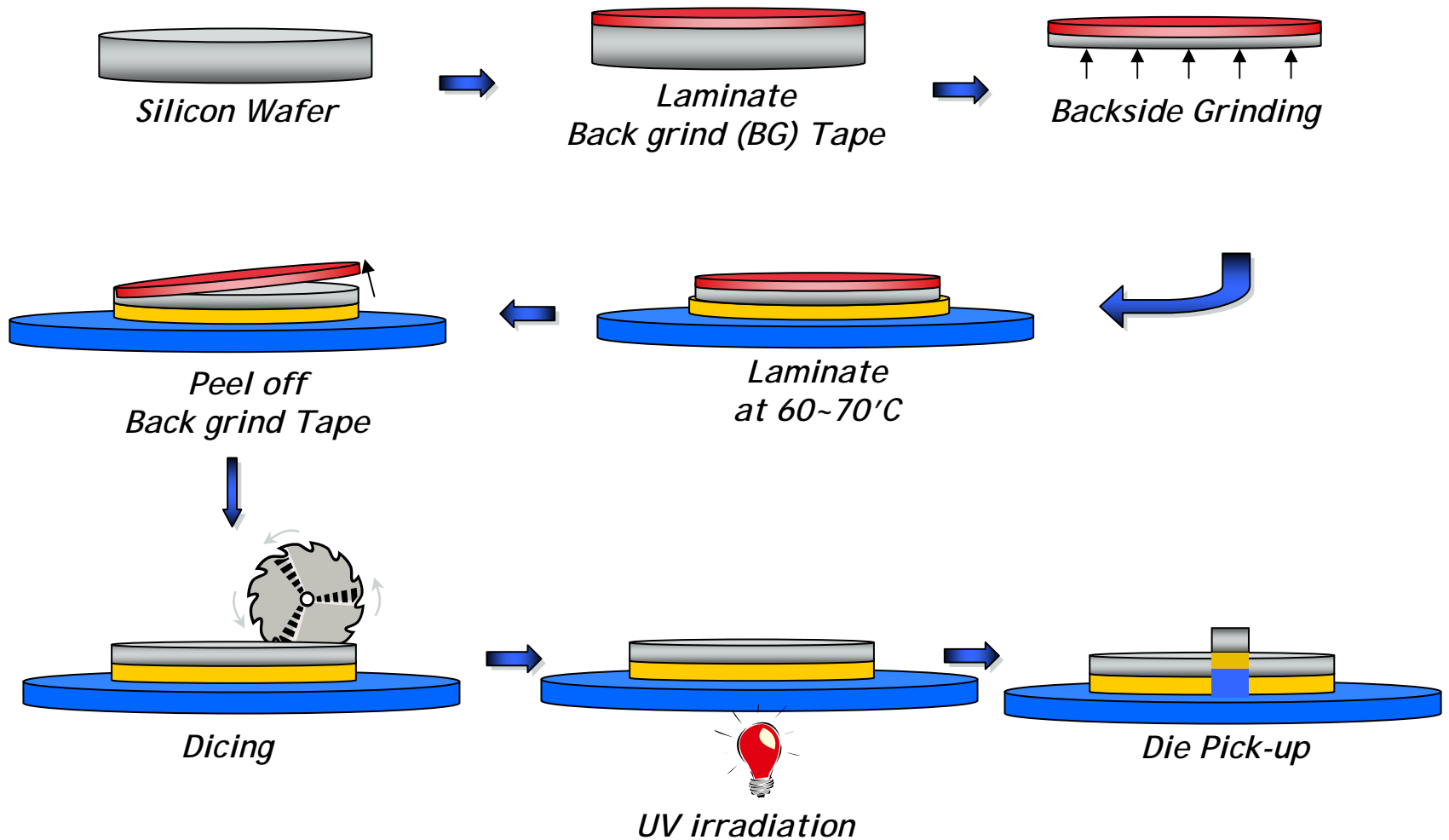
Properties of ATB-F100E

Properties	Unit	ATB-F100E	Test Description
Peel strength to dicing tape - Before UV cure - After UV cure	N/cm	0.97 0.08	Lamination at RT UV dosage 300mJ/sqcm
Die shear strength	kgf/die	3.1	@260C: Die attach: 130 °C, 1.0KG, 1sec, 100×100mil, 1hr cure at 130°C
Peel strength to Si wafer	N/cm	0.55	Lamination at 65°C
Thermal analysis (°C)	°C	179.1	DSC peak, 10°C/min, B-staged film
Weight loss 200°C 300°C	wt%	1.8 2.6	Cured at 175°C for 4hr
Moisture absorption	Wt%	0.78	85°C/85% RH until saturation
CTE	ppm	α 1: 37 α 2: 83	TMA expansion mode with cured film
Modulus -65°C 25°C 100°C 150°C 200°C 250°C	MPa	9755 5256 2004 1092 368 185	Cured at 175°C for 4hrs
Thermal conductivity	W/mK	0.57	Laser flash-25C
Tg (DMTA)	°C	215	Cure condition: 130C×1hr and 175C×4hours

Cure Speed by Isothermal DSC



General process flow for ATB-F100E



Lamination process

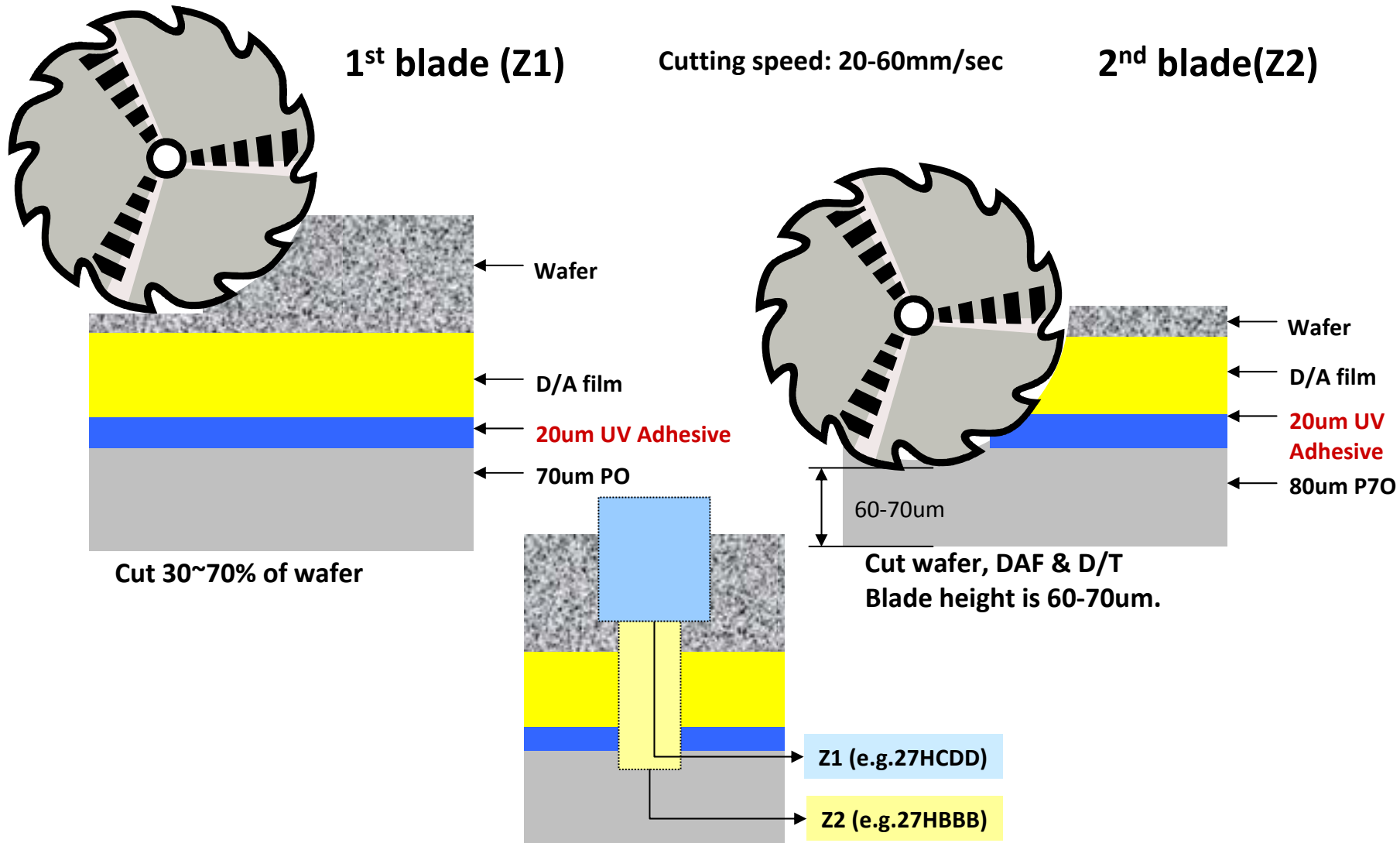
Recommendation of process condition

Typical Recommendations

- Equipment
 - Auto or Semi-auto laminator
 - TSK RM system, DISCO DFM system or any equivalent
- Process condition
 - Temperature: 60~70°C
 - Speed: 10~30mm/sec
 - Pressure: 0.2-0.5 MPa

Dicing process

Recommendation of process condition



Dicing process

Recommendation of process condition

Typical Recommendations

- Equipment
 - Disco, TSK, any equivalent
- Process condition
 - 1st blade: 27HEEE, 27HCDD and so on
 - 1st Blade height : Cut 30-70% of wafer
 - 2nd Blade : 27HCBC, 27HCCC, 27HABB and so on
 - 2nd Blade height : 50-70um
 - SPD speed : 35,000-45,000 RPM
 - Cut speed : 20-60mm/sec

Dicing process

Burr inspection

Test Vehicle

ATB-F160E: 60 μm thick adhesive

Dicing tape: 90 μm

Device: 75 μm Si wafer, 10 x 16mm

Step cut :

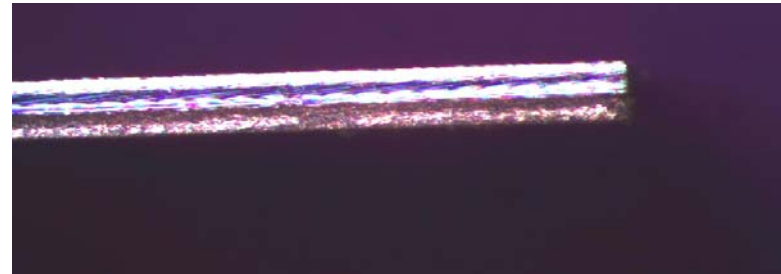
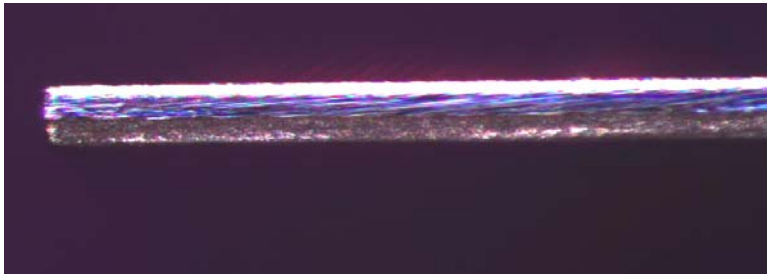
Blade: 27HCDD(Z1), 27HCBB(Z2)

Blade height: 180 μm (Z1), 65 μm (Z2)

Cutting speed: 50mm/sec

SPD speed: 40,000 RPM

UV irradiation: 300mJ/cm²



Clean dicing line, no burr, no re-attach

Dicing process

Pick up test

Test Vehicle

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SPD speed: 40,000 RPM

UV irradiation: 300mJ/cm²

		Pick-up time delay (ms)		
		100	200	300
Eject needle height (mm)	0.1	X	X	X
	0.2	14.3%	7.1%	14.3%
	0.3	0%	0%	0%

* Percentage of failure/trial

Good pick-up performance without thin die kit

Die attach process

Recommendation of process condition

Typical Recommendations

- **Die to Die**
 - **Substrate temp: 110-120°C**
 - **Bonding force: 0.5-1.5kg / 10mmsq die**
 - **Bonding time: 0.5-1.5sec**

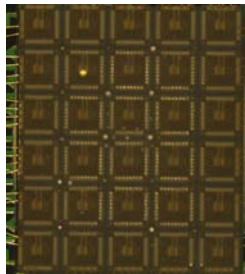
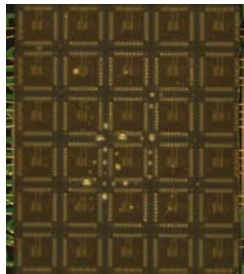
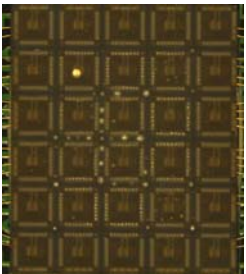
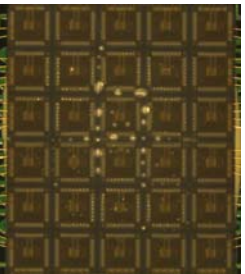
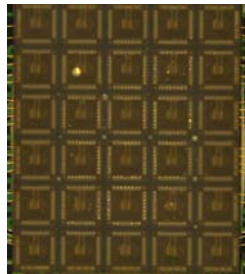
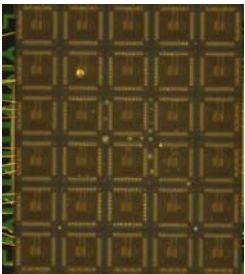
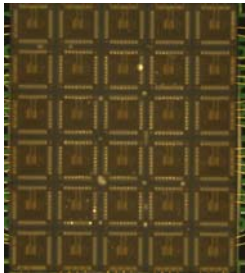
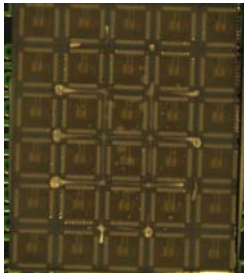
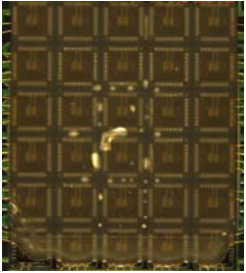
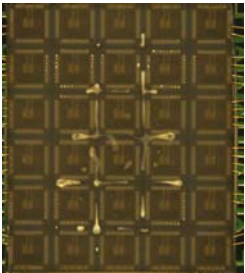
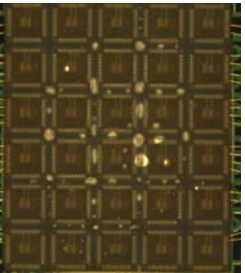
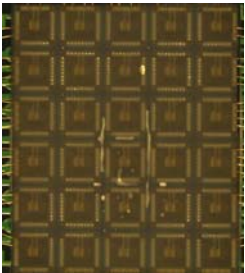
Voiding Performance

Test Vehicle

ATB-F160E: 60 μm thick adhesive

Device: 150 μm glass wafer, 6.3x7.6mm die size

Die attach condition: 120~130°C / 0.5~1.5kg / 0.5-1.5sec

	0.5kg/0.5s	1.5kg/0.5s	0.5kg/1s	1.5kg/1s	0.5kg/1.5s	1.5kg/1.5s
110C						
120C						

Less voids at 110°C DA temperature than 120°C regardless of pressure and time

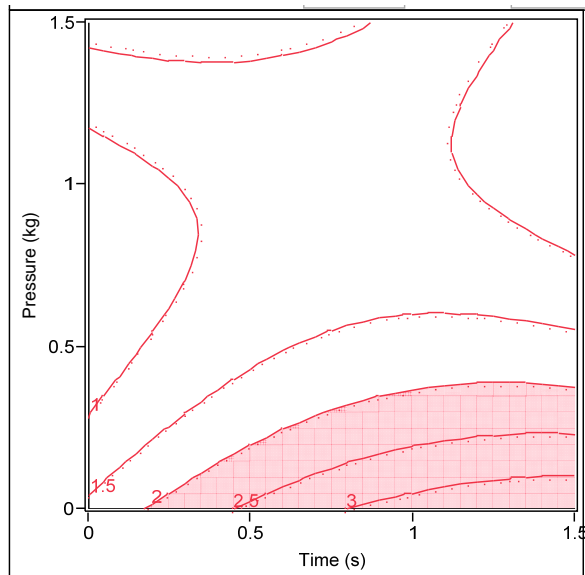
Voiding performance vs die attach

Test Vehicle

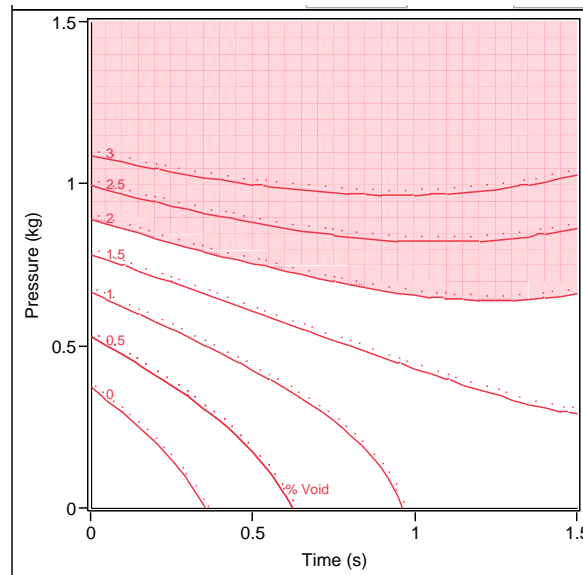
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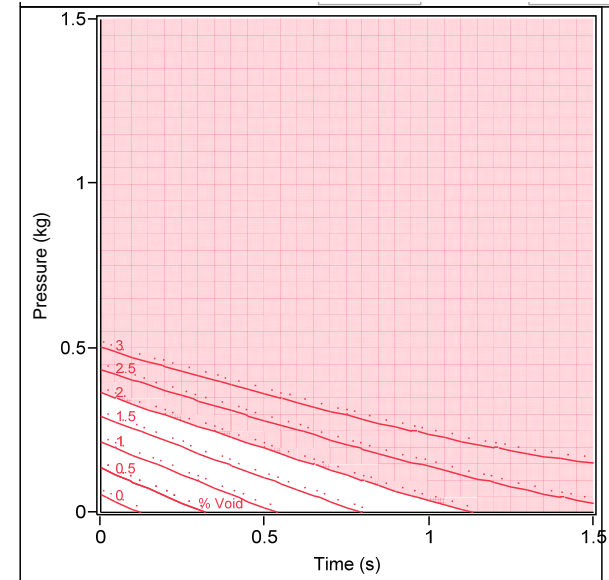
Die attach condition: 110~130°C / 0.5~1.5kg / 0.5-1.5sec



Temperature: 110°C



Temperature: 120°C



Temperature: 130°C

Wide die attach process window to get <2% void at 110°C and 120°C DA temperature

Wire penetration performance

Test Vehicle

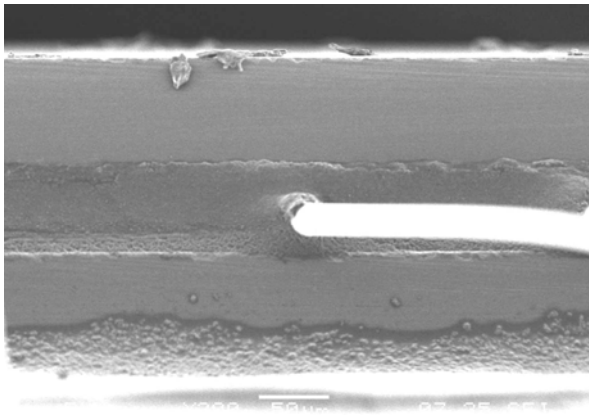
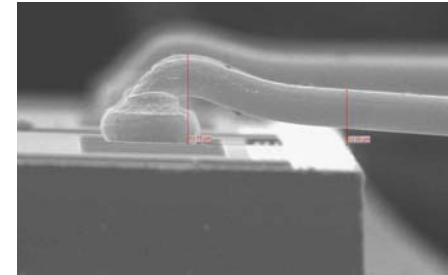
ATB-F160E: 60 μm thick adhesive

Wire bonding: $\sim 52\mu\text{m}$ loop height, 1mil Au wires

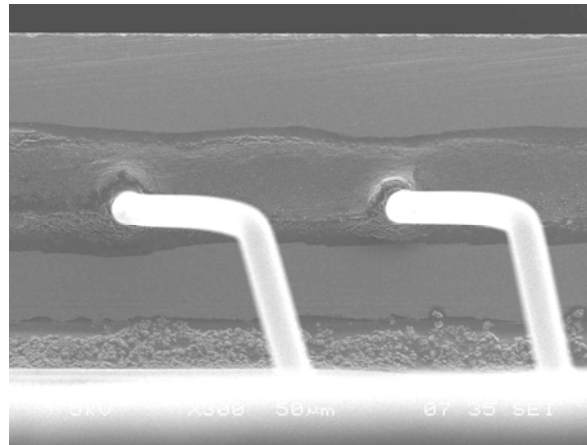
Die size: 6.3x7.6mm, 75 μm die

Die attach condition: 110 \sim 120 $^{\circ}\text{C}$ / 0.5 \sim 1.5kg / 0.5-1.5sec

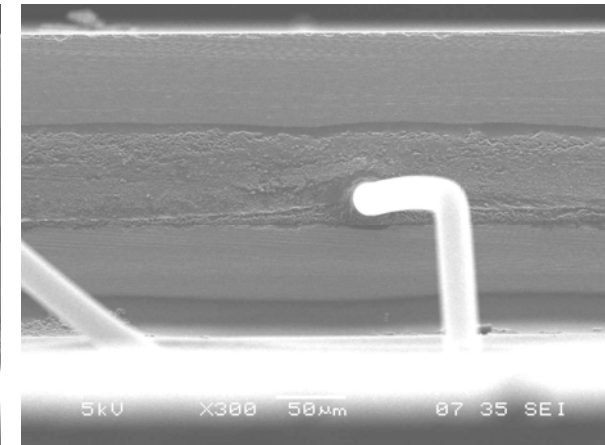
Cure condition: 130 $^{\circ}\text{C}$ /60min+30min ramp



DA: 110C/1.5kgf/0.5s



DA: 110C/1.5kgf/1.5s

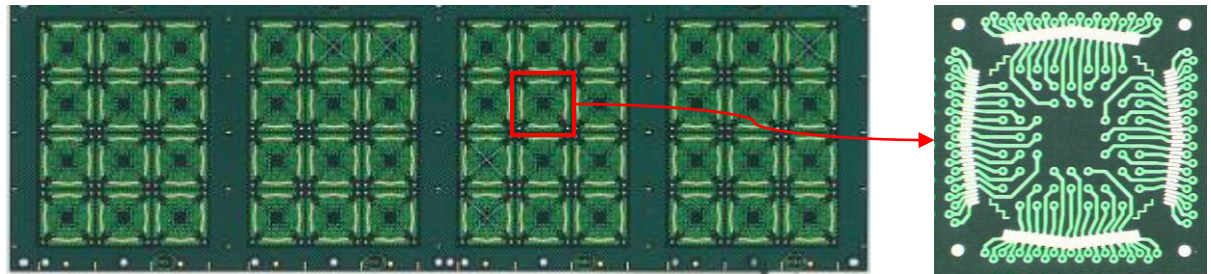


DA: 120C/1.0kgf/0.5s

Excellent wire penetration performance in various die attach conditions

Reliability performance

- Package
 - 12x12mm 2(2+1)D SCSP
 - 3mil thick 300x250mil size die (same size for bottom and top die)
 - Wire bonding: Ultra low loop (loop height around 50um) with 1.0mil wire
 - Bottom D/A adhesive:
 - QMI536NB
 - FoW D/A adhesive: ATB-F160E, cured at 130'C/60min with 30mins ramp
- Substrate
 - Henkel SCSP Rev 5
- Test items
 - MRT L2 with 260'C reflow



Test Vehicle Schematics

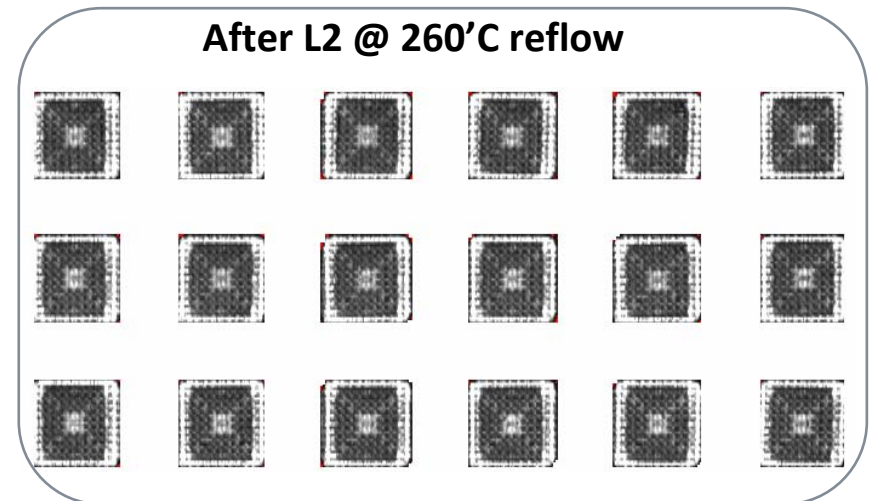
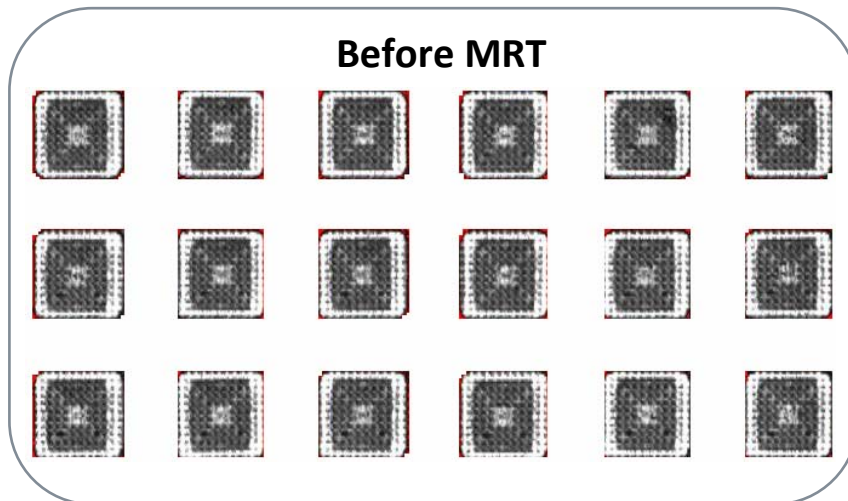
DA1: QMI536NB

DA2: ATB-F160E

MC: EME-G770HCD

Reliability performance

D/A: 110'C/1kgf/1.5s



Passed MRT L2 with 260'C reflow without any issue

Summary of ATB-F100E

- Compatible with UV dicing tape provides good pick up performance without thin die kit
- Good workability (lamination, dicing, pick up, and wide die attach process window)
- Less than 60min cure temp at >130°C
- Excellent flow around the wires without void or overflow issue
- Passed MSL L2/260°C reflow
- 50 and 60um thick films are available

Process recommendation

Lamination & Dicing Conditions

- Wafer Backside Lamination
 - Temperature : 60~70'C
 - Speed : 10~30mm/sec
 - Pressure : 0.2~0.5 MPa
- Dicing condition
 - 1st Blade : 27HEEE, 27HCDD and so on
 - 1st Blade height : cut 30~70% of wafer
 - 2nd Blade : 27HCBC, 27HCCC or 27HABB,.. etc.
 - 2nd Blade height : 50~70um
 - SPD speed : 35~45krpm
 - Cut speed : 20~60mm/sec
- UV irradiation condition
 - 200~300mJ/cm² at room temperature

Process recommendation

Die attach conditions

- Die pick up condition
 - Needle height: >0.2mm
 - Wafer expansion value: 5 - 8mm(depends on machine type)
 - Die pick up time: >100ms
- Die Attach condition
 - Die to Die
 - Substrate temp: 110~120'C
 - Bonding force: 0.5~1.5kg / 10mmsq die
 - Bonding time: 0.5~1.5sec
- Cure condition
 - 130'C/60min