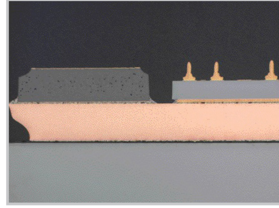
회로기판 (Printed Circuit Boards, PCB)

각 대표재료별 시편전처리 연마공정 및 결과소개

1. 시편 종류

- 회로기판 (Printed Circuit Boards, PCB)



Agilent Package 10x BF

2. 시편 절단 및 성형 공정

Table 1. Cutting Parameters

Trim Saw	
Coolant	Lubri-Cut Cutting Fluid
Wheel Type	Diamond
Wheel Bond	Segmented Rim
Size	6″
Wheel RPM	4000
Feed Rate	12.7 mm/min

Table 2. Cold Mounting Parameters

QuickSet	
Mold Size	1.25″ (32 mm)
Mix Ratio (volume) Powder : Liquid	2 : 1
Cure Time	8 ~ 10min (25℃)

3. 연삭 및 연마 공정

Table 3. MetPrep3™/PH-3™ Griding/Polishing Procedure

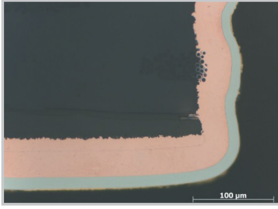
Step	1	2	3	4	5	6
Abrasive Size (P-Grading)	180 Grit (P-180)	320 Grit (P-400)	600 Grit (P-1200)	6 μm	1 μm	0.04 μm
Type	Silicon Carbide	Silicon Carbide	Silicon Carbide	Polycrystalline Diamond	Polycrystalline Diamond	Collodial Silica
Carrier	Abrasive Disc	Abrasive Disc	Abrasive Disc	Glycol Suspension	Glycol Suspension	Suspension
Polishing Cloth	–	–	–	Gold Label	White Label	Final A
Coolant	Water	Water	Water	GreenLube	GreenLube	Water++
Platen Speed(RPM) / Direction	300 Comp	300 Comp	300 Comp	150 Comp	150 Comp	150 Comp
Sample Speed (RPM)	150	150	150	150	150	150
Force (lbf/N) +	5/22	5/22	5/22	5/22	5/22	4/18
Time (min)	1*	1	1	3	2	1

* 시편이 평탄 할 때까지 작업
\+ 1.25″ (32미리)몰드 사용 시: 만일 총 표면면적이 변하는 경우는, 적용하는 압력을 일정하게 유지하기 위해 Force를 조절해 주어야 함.
++ 물은 연마포를 적시어 세척하는 용도임
Comp 플래튼, 시편홀더 동일회전 방향
Contra 플래튼, 시편홀더 반대회전 방향

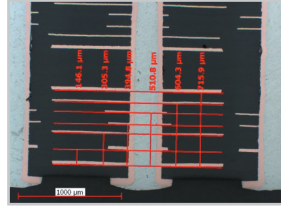
Table 4. AD-5™ Dispensing Parameters

Step	4	5
Type	Diamond Suspension & GreenLube	Colloidal Silica Suspension
Pulses/Min	6	10
Pulse Length	0.5 sec	2.0 sec
Water Flush	Off	On

4. 결과 사진



TPCB microsection, as-polished, 500x, Brightfield



PCB Layer Measurements, 50x Brightfield

5. 사용 소모품 소개

- #65-10030 Segmented Rim Diamond Blade
- #80-10130 Lubri-Cut Cutting Fluid
- #185-10000 QuickSet Acrylic Kit
- #197-10005 1¼″ 2-Part Mounting Cups
- #50-10055 180 Grit Silicon Carbide Abrasive Disc
- #50-10065 320 Grit Silicon Carbide Abrasive Disc
- #50-10075 600 Grit Silicon Carbide Abrasive Disc
- #90-30025 6 µm Polycrystalline Diamond Suspension
- #90-30015 1 µm Polycrystalline Diamond Suspension
- #180-25000 0.04 µm Non-Stick/Rinsable Colloidal Silica
- #90-209000 GreenLube Polishing Lubricant
- #90-700-210 Gold Label Rigid Back Disc
- #90-700-500 White Label Rigid Back Disc
- #180-10705 Final A Rigid Back Disc
- #148-10000 Micro Organic Soap
- #200-20000 Aero-Duster Compressed Air
- #95-10230 GP Cleaning Solution

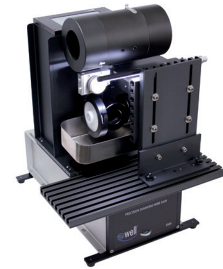
** 소모품 샘플은 무료로 제공해 드리고 있습니다

6. 참조자료

분류 목록 명 : PCB 등 전자재료

1. PCB : 대표자료
2. Microelectronic Devices
4. PCB 단면 상 분석
5. PCB 쿠폰 DIMPLE 분석
6. PCB기판 효과적인 마운팅 방법
13. PCBs (MP)
20. PCB 기판
21. 테프론 PCB 기판
32. Packages on a Circuit Board
34. Populated PCB Cross-Section
35. Si Wafer Pieces with SiO2 Epitaxial Layer
37. 디캡핑 (MP)
38. 세라믹기판 전극
39. Aluminum Oxide Package 단면분석
40. Cu-Mo-Ceramic Package Cross-Section
43. LED Devices with Silicone (MP)
44. Packages on a Circuit Board (MP)
45. Populated PCB Cross-Section
46. Si Wafer Pieces with SiO_2 Epitaxial Layer (MP3 and MP)
49. PCB Microsectioning Kit - Targeted Cross-Sectioning of PCB Through-Holes
50. Small Gold Wires

NEW TrimSaw 2x™ Manual Table Saw



WELL 3500 Premium Diamond Wire Cutting System

Pressure Chamber

MetPrep3™ / PH-3™ Grinding/ Polishing System, AD-5™ Automatic Fluid Dispenser

상세 기술자료, 소모품 샘플 및 기술상담이 필요하시면,
(주)진우테크 시편전처리 센터로 연락 주시기 바랍니다
email: info@chinwoo.co.kr 전화: 031-777-1277

직접회로(IC) 칩

1. 시편 종류

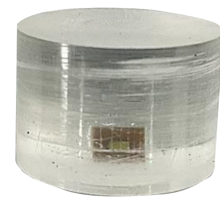
- 전자 칩 카드

2. 시편 준비 과정

1) 시편을 Wire 절단기(WELL 3500 Premium)를 이용하여 분석하고자 하는 부분을 절단한다.
2) 절단된 시편을 Glass Cover Slips에 부착한다.

Table 1. Cold Mounting Parameters

EpoxySet	
Mold Size	1.25" (32 mm)
Mix Ratio (weight) Resin : Hardener	10:3
Cure Time	2Hours (25℃)



3. 연삭 및 연마 공정

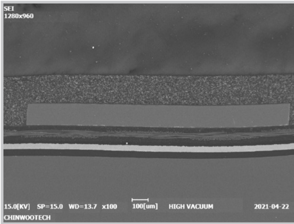
Table 2. Grinding/Polishing - Auto Polisher

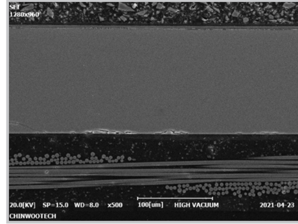
Step	Grinding				Polishing	
	1	2	3	4	5	6
Abrasive	320Grit (P-400)	600Grit (P-1200)	800Grit (P-2400)	1200Grit (P-4000)	3 μm	0.04 μm
Type	SiC	SiC	SiC	SiC	Diamond	Colloidal Silica
Carrier	Abrasive Disc	Abrasive Disc	Abrasive Disc	Abrasive Disc	Suspension	Suspension
Polishing Cloth	-	-	-	-	DiaMat	Chem-Pol
Coolant	Water	Water	Water	Water	GreenLube	-
Platen Speed(RPM) / Direction	100/Comp	100/Comp	100/Comp	100/Comp	100/Contra	100/Contra
Sample Speed (RPM)	90	90	90	90	90	90
Force (lbF)	3	3	4	4	3	3
Time (min)	UntilTarget	2'00"	2'30"	2'30"	3'00"	1'00"

Table 3. AD-5™ Dispensing Parameters

Step	5
Type	Diamond Suspension & GreenLube
Pulses/Min	6
Pulse Length	0.5sec
Water Flush	Off

4. 결과 사진


x100


x500

5. 사용 소모품 소개

- #72-20000 Glass Cover Slips
- #145-20000 EpoxySet Kit
- #197-10005 1.25" 2-part Mounting Cups
- #50-10065 320 Grit Silicon Carbide Abrasive Disc
- #50-10075 600 Grit Silicon Carbide Abrasive Disc
- #50-70076 800 Grit Silicon Carbide Abrasive Disc
- #50-10077 1200 Grit Silicon Carbide Abrasive Disc
- #90-30020 3 μm Polycrystalline Diamond Suspension
- #180-25010 0.04 μm Colloidal Silica Suspension
- #90-700-550 DiaMat Rigid Back Disc
- #90-209000 GreenLube™ Polishing Lubricant
- #180-10750 Chem-Pol Rigid Back Disc
- #148-10000 Micro Organic Soap
- #200-20000 Aero-Duster Compressed Air
- #95-10230 GP Cleaning Solution

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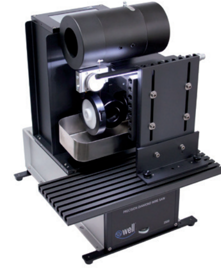
50. Small Gold Wires


WELL 3500 Premium Diamond Wire Cutting System

NEW TechCut 5x™ Precision High Speed Saw

VacuPrep™ Epoxy Impregnation System

DualPrep3™/PH-4™ Grinding/Polishing System, AD-5™ Automatic Fluid Dispenser

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email: info@chinwoo.co.kr 전화: 031-777-1277

전자재료(Gull Wing Leads)

1. 시편 종류

- PCB

2. 시편 준비 과정

1) 시편을 세라믹 플레이트에 Hot Mounting Wax를 이용하여 부착한다.
2) 시편이 부착된 세라믹 플레이트를 Wire 절단기(WELL 3500 Premium)에 고정하여 분석하고자 하는 부분을 절단한다.

Table 1. Cold Mounting Parameters

EpoxySet	
Mold Size	1.25" (32 mm)
Mix Ratio (weight) Resin : Hardener	100:12
Cure Time	8 Hours (25℃)

3. 연삭 및 연마 공정

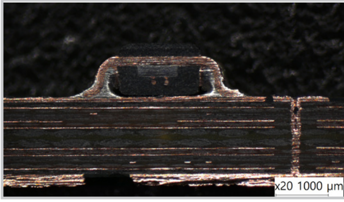
Table 2. Grinding/Polishing - Auto Polisher

Step	Grinding				Polishing	
	1	2	3	4	5	6
Abrasive	320Grit (P-400)	600Grit (P-1200)	800Grit (P-2400)	1200Grit (P-4000)	3 μm	0.05 μm
Type	SiC	SiC	SiC	SiC	Diamond	FinalPrep
Carrier	Abrasive Disc	Abrasive Disc	Abra sive Disc	Abrasive Disc	Suspension	Solution
Polishing Cloth	-	-	-	-	DiaMat	Final A
Coolant	Water	Water	Water	Water	GreenLube	-
Platen Speed(RPM) / Direction	100 /Comp	100 /Comp	100 /Comp	100 /Comp	100 /Contra	100 /Contra
Sample Speed (RPM)	90	90	90	90	90	90
Force (lbF)	3	3	4	4	3	3
Time (min)	Until Flat	Until Target	2'00"	2'30"	2'00"	1'30"

Table 3. AD-5™ Dispensing Parameters

Step	5
Type	Diamond Suspension & GreenLube
Pulses/Min	6
Pulse Length	0.5sec
Water Flush	Off

4. 결과 사진



x20

x25

5. 사용 소모품 소개

- #71-10040 Hot Mounting Wax
- #205-10050 Sample Holding Clips
- #145-20000 EpoxySet Kit
- #197-10005 1.25" 2-part Mounting Cups
- #50-10065 320 Grit Silicon Carbide Abrasive Disc
- #50-10075 600 Grit Silicon Carbide Abrasive Disc
- #50-70076 800 Grit Silicon Carbide Abrasive Disc
- #50-10077 1200 Grit Silicon Carbide Abrasive Disc
- #90-30020 3 µm Polycrystalline Diamond Suspension
- #90-187740 0.05 µm FinalPrep Polishing Solution
- #90-700-550 DiaMat Rigid Back Disc
- #90-209000 GreenLube™ Polishing Lubricant
- #180-10705 Final A Rigid Back Disc
- #148-10000 Micro Organic Soap
- #200-20000 Aero-Duster Compressed Air
- #95-10230 GP Cleaning Solution

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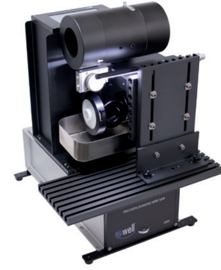
WELL 3500 Premium Diamond Wire Cutting System

NEW TechCut 5x™ Precision High Speed Saw

VacuPrep™ Epoxy Impregnation System

DualPrep3™/PH-4™ Grinding/Polishing System, AD-5™ Automatic Fluid Dispenser

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email: info@chinwoo.co.kr 전화: 031-777-1277

솔더볼 (Solder Ball) 각 대표재료별 시편전처리 연마공정 및 결과소개

1. 시편 종류

- 솔더볼 (Solder Ball)

Ceramic Flip Chip, 1000x BF

2. 시편 절단 및 성형 공정

Table 1. Cutting Parameters

NEW TechCut 5x™	
Coolant	Lubri-Cut Cutting Fluid
Wheel Type	Diamond
Wheel Bond	Resin
Size	7"
Wheel RPM	3200
Feed Rate	12.7 mm/min

Table 2. Cold Mounting Parameters

QuickSet	
Mold Size	1.25″ (32 mm)
Mix Ratio (volume) Powder : Liquid	2 : 1
Cure Time	8 ~ 10 min (25℃)

3. 연삭 및 연마 공정

Table 3. MetPrep3™/PH-3™ Griding/Polishing Procedure

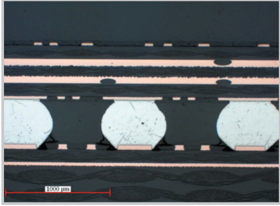
	Step	1	2	3	4	5	6
Consumables	Abrasive Size (P-Grading)	320 Grit (P-400)	600 Grit (P-1200)	1200 Grit (P-4000)	3 μm	0.25 μm	0.05 μm
	Type	Silicon Carbide	Silicon Carbide	Silicon Carbide	Polycrystalline Diamond	Polycrystalline Diamond	FinalPrep
	Carrier	Abrasive Disc	Abrasive Disc	Abrasive Disc	Glycol Suspension	Glycol Suspension	Solution
	Polishing Cloth	–	–	–	Gold Label	DiaMat	Final A
	Coolant	Water	Water	Water	GreenLube	GreenLube	Water++
Settings	Platen Speed(RPM) / Direction	300 Comp	300 Comp	300 Comp	150 Comp	150 Comp	150 Comp
	Sample Speed (RPM)	150	150	150	150	150	150
	Force (lbf/N) +	5/22	5/22	4/18	5/22	5/22	4/18
	Time (min)	1*	1	2	4	3	1

* 시편이 평탄 할 때까지 작업
\+ 1.25″ (32미리)몰드 사용 시: 만일 총 표면면적이 변하는 경우는, 적용하는 압력을 일정하게 유지하기 위해 Force를 조절해 주어야 함.
++ 물은 연마포를 적시어 세척하는 용도임
Comp 플래튼, 시편홀더 동일회전 방향
Contra 플래튼, 시편홀더 반대회전 방향

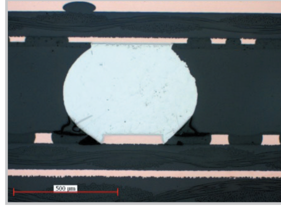
Table 4. AD-5™ Dispensing Parameters

Step	4&5
Type	Diamond Suspension & GreenLube
Pulses/Min	6
Pulse Length	0.5 sec
Water Flush	Off

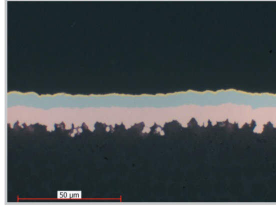
4. 결과 사진



PBGA, Colloidal Silica/ Alumina 50x, Brightfield



PBGA, Colloidal Silica/ Alumina 100x, Brightfield



Flex board gold plating, 1000x, Brightfield

5. 사용 소모품 소개

- #60-20081 7″ Resin Bonded Diamond Blade
- #80-10130 Lubri-Cut Cutting Fluid
- #180-10000 Quick Set Kit
- #197-10005 1¼″ 2-Part Mounting Cups
- #50-10065 320 Grit Silicon Carbide Abrasive Disc
- #50-10075 600 Grit Silicon Carbide Abrasive Disc
- #50-10077 1200 Grit Silicon Carbide Abrasive Disc
- #90-30020 3 µm Polycrystalline Diamond Suspension
- #90-30005 0.25 µm Polycrystalline Diamond Suspension
- #90-187775 0.05 µm FinalPrep Polishing Solution
- #90-209000 GreenLube™ Polishing Lubricant
- #90-700-210 Gold Label Rigid Back Disc
- #90-700-550 DiaMat Rigid Back Disc
- #180-10705 Final A Rigid Back Disc
- #148-10000 Micro Organic Soap
- #200-20000 Aero-Duster Compressed Air
- #95-10230 GP Cleaning Solution

** 소모품 샘플은 무료로 제공해 드리고 있습니다

6. 참조자료

분류 목록 명 : PCB 등 전자재료

3. 솔더볼 (수동)

27. 솔더볼 (오토폴리셔)

분류 목록 명 : SEM, EBSD, TEM, SIMS, AFM, FTIR 및 IMS

2. 솔더볼 SEM 시편 (MP)

15. 실리콘 다이 솔더볼 분석

36. 기판 솔더볼 단면

42. Lead-Free Solder Balls in Package (MP)

NEW TechCut 5x™ Precision High Speed Saw

WELL 3500 Premium Diamond Wire Cutting System

Pressure Chamber

MetPrep3™ / PH-3™ Grinding/ Polishing System, AD-5™ Automatic Fluid Dispenser

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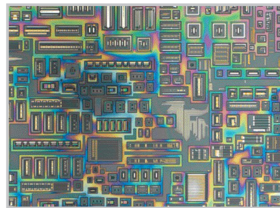
email: info@chinwoo.co.kr 전화: 031-777-1277

전자재료 X-Prep 적용사례 각 대표재료별 시편전처리 연마공정 및 결과소개

1. 시편 종류

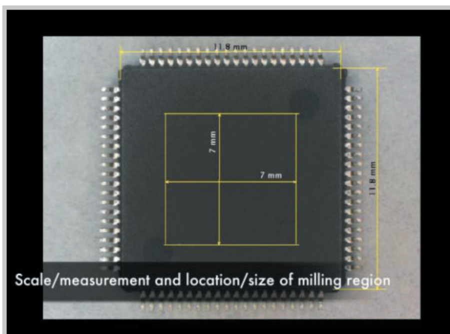
- PQFP(Plastic Quard Flat Package)


IC Parallel Delayering

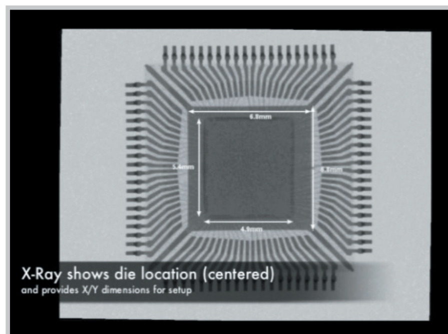
2. 공정조건

Step	1	2	3	4	5	6
Description	Mold Compound 제거	Cu Lead Frame 제거	Silicon Thinning	Polishing	Polishing	Final Polishing
Tool	Fine Bonded Dia-mond	4-flute Carbide End Mill	Very Fine Bonded Diamond	Planar Pad 6 μm Diamond	Final Pol 1 μm Diamond	Chem Pol 0.04 μm Silica
Tool Speed (RPM)	3,000(wet)	20,000(dry)	30,000(wet)	6,000	5,000	5,000
X/Y rate (mm/s)	8	8	8	8	8	8
Pattern	Any	Any	Combo	Combo	Combo	Combo
Overlap	75%	75%	75%	95%	95%	95%
Z-mode	Position	Position	Position	Floating Force 3N	Floating Force 2.5N	Floating Force 1.2N
Time	2:40	1:45	4:00	3:30	3:30	4:00

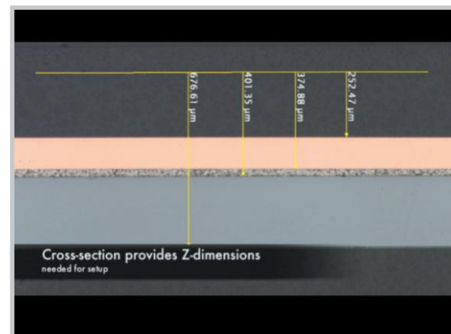
3. 분석결과



작업영역

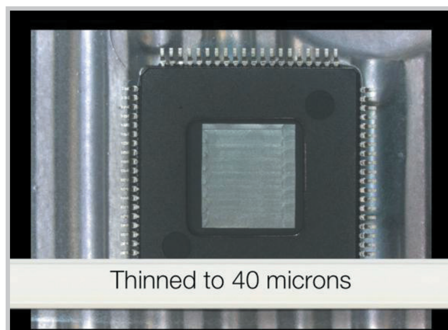


Chip위치에 대한 X-ray정보



작업전 단면 정보

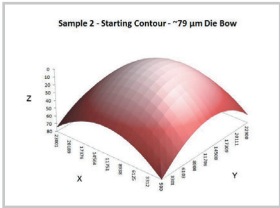
작업 후 결과 단면



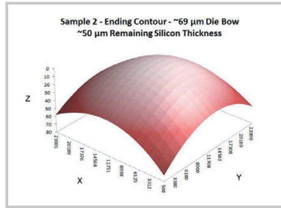
Thinning후 표면 형상

최종 표면 형상

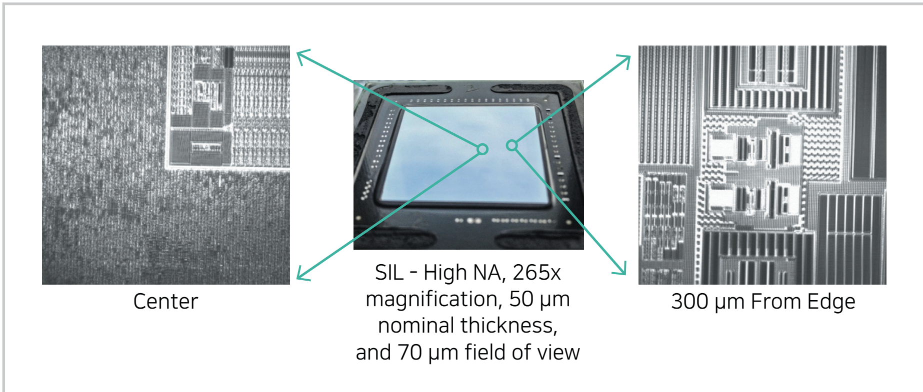
Ⅱ. Contoured Device Sample Preparation - EFA with SIL imaging



가공 전



가공 후

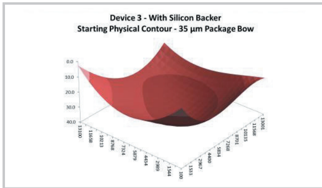

Center

SIL - High NA, 265x magnification, 50 µm nominal thickness, and 70 µm field of view

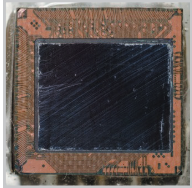
300 µm From Edge

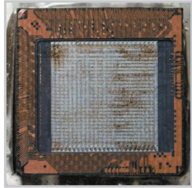
SIL 관찰결과 중앙부와 가장자리의 선명한 이미지를 얻을 수 있었음, 이는 잔류 silicon 50 µm에서 두께편차가 5 µm이내임을 입증해 준다.

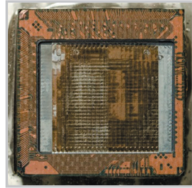
Ⅱ. Stacked Die Deprocessing - Backside deprocessing

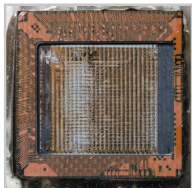


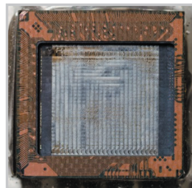
Backside Contour

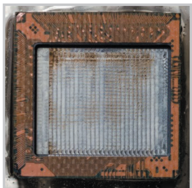

1st Die exposed

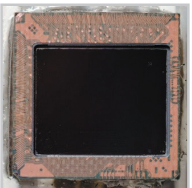

2nd Die exposed

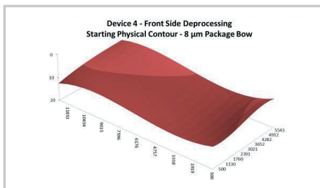

3rd Die exposed


4th Die exposed

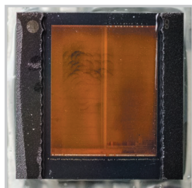

5th Die exposed

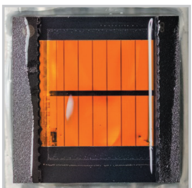

6th Die exposed


Finish polished on 7th Die

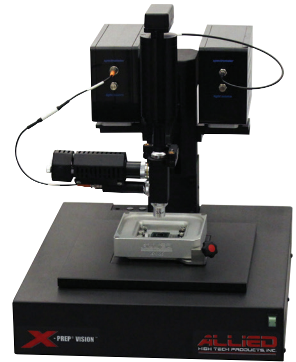


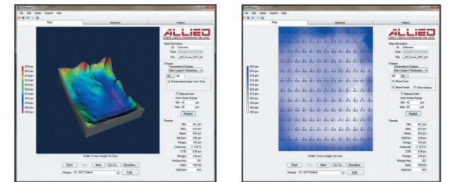
Front side Contour


8th die exposed


7th Die exposed

X-Prep®


X-Prep® Vision™


Both 3D & 2D Data Provided

VacuPrep™ Epoxy Impregnation System

상세 기술자료, 소모품 샘플 및 기술상담이 필요하시면,
(주)진우테크 시편전처리 센터로 연락 주시기 바랍니다
email: info@chinwoo.co.kr 전화: 031-777-1277