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Design and Assembly Process Implementation for BGAs

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IPC-7095C

Design and Assembly Process Implementation for BGAs

Developed by the IPC Ball Grid Array Task Group (5-21f) of the Assembly & Joining Processes Committee (5-20) of IPC

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Table of Contents

1 SCOPE ... 1
1.1 Purpose ... 1
1.2 Intent ... 1

2 APPLICABLE DOCUMENTS ... 1
2.1 IPC ... 1
2.2 JEDEC ... 2

3 SELECTION CRITERIA AND MANAGING BGA IMPLEMENTATION ... 2
3.1 Description of Infrastructure ... 3
3.1.1 Land Patterns and Circuit Board Considerations ... 3
3.1.2 Technology Comparison ... 5
3.1.3 Assembly Equipment Impact ... 8
3.1.4 Stencil Requirements ... 8
3.1.5 Inspection Requirements ... 9
3.1.6 Test ... 9
3.2 Time-to-Market Readiness ... 9
3.3 Methodology ... 9
3.4 Process Step Analysis ... 9
3.5 BGA Limitations and Issues ... 9
3.5.1 Visual Inspection ... 10
3.5.2 Moisture Sensitivity ... 10
3.5.3 Thermally Unbalanced BGA Design ... 10
3.5.4 Rework ... 11
3.5.5 Cost ... 11
3.5.6 Availability ... 12
3.5.7 Voids in BGA ... 12
3.5.8 Pad Cratering ... 12
3.5.9 Standardization Issues ... 12
3.5.10 Reliability Concerns ... 13
3.5.11 Drivers for Lead-Free Technology ... 14

4 COMPONENT CONSIDERATIONS ... 14
4.1 Semiconductor Packaging Comparisons and Drivers ... 14
4.1.1 Package Feature Comparisons ... 14
4.1.2 BGA Package Drivers ... 15
4.1.3 Cost Issues ... 15
4.1.4 Component Handling ... 15
4.1.5 Thermal Performance ... 17
4.1.6 Real Estate ... 17
4.1.7 Electrical Performance ... 17
4.1.8 Mechanical Performance ... 17
4.2 Die Mounting in the BGA Package ... 17
4.2.1 Wire Bond ... 18
4.2.2 Flip Chip ... 19
4.3 Standardization ... 19
4.3.1 Industry Standards for BGA ... 19
4.3.2 Ball Pitch ... 20
4.3.3 BGA Package Outline ... 21
4.3.4 Ball Size Relationships ... 21
4.3.5 Package-on-Package BGA ... 22
4.3.6 Coplanarity ... 22
4.4 Component Packaging Style Considerations ... 23
4.4.1 Solder Ball Alloy ... 23
4.4.2 Ball Attach Process ... 24
4.4.3 Ceramic Ball Grid Arrays ... 24
4.4.4 Ceramic Column Grid Arrays ... 25
4.4.5 Tape Ball Grid Arrays ... 25
4.4.6 Multiple Die Packaging ... 25
4.4.7 System-in-Package (SiP) ... 26
4.4.8 3D Folded Package Technology ... 27
4.4.9 Ball Stack, Package-on-Package ... 27
4.4.10 Folded and Stacked Packaging Combination ... 28
4.4.11 Package-on-Package ... 28
4.4.12 Benefits of Multiple Die Packaging ... 28
4.4.13 Solutions for Very Fine Pitch Array Packaging ... 28
4.5 BGA Connectors and Sockets ... 29
4.5.1 Material Considerations for BGA Connectors ... 29
4.5.2 Attachment Considerations for BGA Connectors ... 29
4.5.3 BGA Materials and Socket Types ... 30
4.5.4 Attachment Considerations for BGA Sockets ... 30
4.6 BGA Construction Materials ... 31
4.6.1 Types of Substrate Materials ... 31
4.6.2 Properties of Substrate Materials ... 33
4.7 BGA Package Design Considerations ... 33
4.7.1 Power and Ground Planes ... 33
4.7.2 Signal Integrity ... 34
4.7.3 Heat Spreader Incorporation Inside the Package ... 34
4.8 BGA Package Acceptance Criteria and Shipping Format ... 34
4.8.1 Missing Balls ... 34
4.8.2 Voids in Solder Balls ... 34

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4.8.3 Solder Ball Attach Integrity 35
4.8.4 Package and Ball Coplanarity 35
4.8.5 Moisture Sensitivity (Baking, Storage, Handling, Rebaking) 36
4.8.6 Shipping Medium (Tape and Reel, Trays, Tubes) 37
4.8.7 Solder Ball Alloy 37

5 PRINTED BOARDS AND OTHER MOUNTING STRUCTURES 37
5.1 Types of Mounting Structures 37
5.1.1 Organic Resin Systems 37
5.1.2 Inorganic Structures 37
5.1.3 Layering (Multilayer, Sequential or Build-Up) 37
5.2 Properties of Mounting Structures 37
5.2.1 Resin Systems 37
5.2.2 Reinforcements 38
5.2.3 Laminate Material Properties 39
5.3 Surface Finishes 40
5.3.1 Hot Air Solder Leveling (HASL) 41
5.3.2 Organic Surface Protection (Organic Solderability Preservative) OSP Coatings 42
5.3.3 Noble Platings/Coatings 42
5.4 Solder Mask 46
5.4.1 Wet and Dry Film Solder Masks 46
5.4.2 Photoimageable Solder Masks 47
5.4.3 Jettable Solder Mask 47
5.4.4 Registration of Board to Panel Image for Solder Mask 47
5.4.5 Via Protection 47
5.5 Thermal Spreader Structure Incorporation (e.g., Metal Core Boards) 48
5.5.1 Lamination Sequences 48
5.5.2 Heat Transfer Pathway 48

6 PRINTED CIRCUIT ASSEMBLY DESIGN CONSIDERATION 50
6.1 Component Placement and Clearances 50
6.1.1 Pick and Place Requirements 50
6.1.2 Repair/Rework Requirements 50
6.1.3 Global Placement 51
6.1.4 Alignment Legends (Silkscreen, Copper Features, Pin 1 Identifier) 51
6.2 Attachment Sites (Land Patterns and Vias) 52
6.2.1 Big vs. Small Land and Impact on Routing 52
6.2.2 Solder Mask vs. Metal Defined Land Design 52
6.2.3 Conductor Width 53
6.2.4 Via Size and Location 54
6.3 Escape and Conductor Routing Strategies 54
6.3.1 Escape Strategies 57
6.3.2 Surface Conductor Details 58
6.3.3 Dog Bone Through Via Details 58
6.3.4 Design for Mechanical Strain 58
6.3.5 Uncapped Via-in-Pad and Impact on Reliability Issues 59
6.3.6 Fine Pitch BGA Microvia in Pad Strategies 60
6.3.7 Power and Ground Connectivity 61
6.4 Impact of Wave Solder on Top Side BGAs 61
6.4.1 Top Side Reflow 61
6.4.2 Impact of Top Side Reflow 61
6.4.3 Methods of Avoiding Top Side Reflow 62
6.4.4 Top Side Reflow for Lead-Free Boards 64
6.5 Testability and Test Point Access 64
6.5.1 Component Testing 64
6.5.2 Damage to the Solder Ball During Test and Burn-In 64
6.5.3 Bare Board Testing 65
6.5.4 Assembly Testing 66
6.6 Other Design for Manufacturability Issues 68
6.6.1 Panel/Pallet Design 68
6.6.2 In-Process/End Product Test Coupons 68
6.7 Thermal Management 69
6.7.1 Conduction 70
6.7.2 Radiation 70
6.7.3 Convection 70
6.7.4 Thermal Interface Materials 71
6.7.5 Heat Sink Attachment Methods for BGAs 72
6.8 Documentation and Electronic Data Transfer 73
6.8.1 Drawing Requirements 74
6.8.2 Equipment Messaging Protocols 74
6.8.3 Specifications 75

7 ASSEMBLY OF BGAS ON PRINTED CIRCUIT BOARDS 76
7.1 SMT Assembly Processes 76
7.1.1 Solder Paste and Its Application 76
7.1.2 Component Placement Impact 78
7.1.3 Vision Systems for Placement 78
7.1.4 Reflow Soldering and Profiling 79
7.1.5 Material Issues 84
7.1.6 Vapor Phase 84
7.1.7 Cleaning vs. No-Clean 84
7.1.8 Package Standoff 85
7.2 Post-SMT Processes 86
7.2.1 Conformal Coatings 86

Currently in preview, click buy full version

7.2.2 Use of Underfills and Adhesives 86
7.2.3 Depaneling of Boards and Modules 90
7.3 Inspection Techniques 91
7.3.1 X-Ray Usage 91
7.3.2 X-Ray Image Acquisition 91
7.3.3 Definition and Discussion of X-Ray System Terminology 92
7.3.4 Analysis of the X-Ray Image 95
7.3.5 Scanning Acoustic Microscopy 97
7.3.6 BGA Standoff Measurement 97
7.3.7 Optical Inspection 97
7.3.8 Destructive Analysis Methods 99
7.4 Testing and Product Verification 100
7.4.1 Electrical Testing 100
7.4.2 Test Coverage 101
7.4.3 Burn-In Testing 101
7.4.4 Product Screening Tests 101
7.5 Void Identification 101
7.5.1 Sources of Voids 101
7.5.2 Void Classification 102
7.5.3 Voids in BGA Solder Joints 102
7.6 Void Measurement 104
7.6.1 X-Ray Detection and Measurement Cautions 104
7.6.2 Impact of Voids 104
7.6.3 Void Protocol Development 104
7.6.4 Sampling Plans for Void Evaluation 105
7.7 Process Control for Void Reduction 106
7.7.1 Process Parameter Impact on Void Formation 106
7.7.2 Process Control Criteria for Voids in Solder Balls 108
7.7.3 Process Control Criteria 109
7.8 Solder Defects 109
7.8.1 Solder Bridging 109
7.8.2 Cold Solder 109
7.8.3 Opens 109
7.8.4 Insufficient/Uneven Heating 109
7.8.5 Head-on-Pillow 110
7.8.6 Hanging Ball/Non-Wet Open (NWO) 112
7.8.7 Component Defects 112
7.8.8 Defect Correlation/Process Improvement 113
7.9 Repair Processes 113
7.9.1 Rework/Repair Philosophy 113
7.9.2 Removal of BGA 113
7.9.3 Replacement 114

8 RELIABILITY 117
8.1 Reliability Drivers for BGAs 117
8.1.1 Cyclic strain 117
8.1.2 Fatigue 117
8.1.3 Creep 118
8.1.4 Creep and Fatigue Interaction 118
8.1.5 Mechanical reliability 119
8.2 Damage Mechanisms and Failure of Solder Attachments 119
8.2.1 Comparison of Thermal Fatigue Crack Growth Mechanism in SAC vs. Tin/Lead BGA Solder Joints 119
8.2.2 Mixed Alloy Soldering 121
8.3 Solder Joints and Attachment Types 122
8.3.1 Global Expansion Mismatch 123
8.3.2 Local Expansion Mismatch 123
8.3.3 Internal Expansion Mismatch 123
8.4 Solder Attachment Failure 123
8.4.1 Solder Attachment Failure Classification 123
8.4.2 Failure Signature-1: Cold Solder 123
8.4.3 Failure Signature-2: Land, Nonsolderable 124
8.4.4 Failure Signature-3: Ball Drop 124
8.4.5 Failure Signature-4: Missing Ball 124
8.4.6 Failure Signature-5: PCB and BGA Stack Warpage 124
8.4.7 Failure Signature-6: Mechanical Failure 126
8.4.8 Failure Signature-7: Insufficient Reflow 127
8.5 Critical Factors to Impact Reliability 127
8.5.1 Package Technology 127
8.5.2 Stand-Off Height 128
8.5.3 PCB Design Considerations 129
8.5.4 Reliability of Solder Attachments of Ceramic Grid Array 129
8.5.5 Lead-Free Soldering of BGAs 129
8.6 Design for Reliability (DfR) Process 135
8.7 Validation and Qualification Tests 135
8.8 Screening Procedures 136
8.8.1 Solder Joint Defects 136
8.8.2 Screening Recommendations 136
8.9 Accelerated Reliability Testing 136

9 DEFECT AND FAILURE ANALYSIS CASE STUDIES 138
9.1 Solder Mask Defined BGA Conditions 138
9.1.1 Solder Mask Defined and Nondefined Lands 138
9.1.2 Solder Mask Defined Land on Product Board 139
9.1.3 Solder Mask Defined BGA Failures 139

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9.2 Over-Collapse BGA Solder Ball Conditions .. 140
9.2.1 BGA Ball Shape without Heat Slug 500 µm Standoff Height 140
9.2.2 BGA Ball Shape with Heat Slug 375 µm Standoff Height 140
9.2.3 BGA Ball Shape with Heat Slug 300 µm Standoff Height 140
9.2.4 Critical Solder Paste Conditions 141
9.2.5 Overly Thick Paste Deposit 141
9.2.6 Void Determination Through X-Ray and Cross-Section 141
9.2.7 Voids and Uneven Solder Balls 141
9.2.8 Eggshell Void 142
9.3 BGA Interposer Bow and Twist 142
9.3.1 BGA Interposer Warp 142
9.3.2 Solder Joint Opens Due to Interposer Warp ... 143
9.4 Solder Joint Conditions 143
9.4.1 Target Solder Condition 143
9.4.2 Solder Balls with Excessive Oxide 143
9.4.3 Evidence of Dewetting 144
9.4.4 Mottled Condition 144
9.4.5 Tin/Lead Solder Ball Evaluation 144
9.4.6 SAC Alloy 144
9.4.7 Cold Solder Joint 145
9.4.8 Incomplete Joining Due to Land Contamination 145
9.4.9 Deformed Solder Ball Contamination 145
9.4.10 Deformed Solder Ball 145
9.4.11 Insufficient Solder and Flux for Proper Joint Formation 146
9.4.12 Reduced Termination Contact Area 146
9.4.13 Solder Bridging 146
9.4.14 Incomplete Solder Reflow 146
9.4.15 Missing Solder 147
9.4.16 Nonwet Open (NWO) Solder Joint 147
9.4.17 Head-on-Pillow (HoP) Solder Joint 147

10 GLOSSARY AND ACRONYMS 148

11 BIBLIOGRAPHY AND REFERENCES 150

Appendix A Process Control Characterization to Reduce the Occurrence of Voids 151

Figures

Figure 3-1 BGA Package Manufacturing Process 3
Figure 3-2 Area Array I/O Position Comparisons 5
Figure 3-3 Area Array I/O Position Patterns 5
Figure 3-4 MCM Type 2S-L-WB 6
Figure 3-5 Conductor Width to Pitch Relationship 7
Figure 3-6 Plastic Ball Grid Array, Chip Wire Bonded 8
Figure 3-7 Ball Grid Array, Flip Chip Bonded 8
Figure 3-8 BGA Warpage 11
Figure 3-9 Examples of Pad Cratering 13
Figure 3-10 Various Possible Failure Modes for a BGA Solder Joint 13
Figure 4-1 Termination Types for Area Array Packages .. 16
Figure 4-2 BOC BGA Construction 18
Figure 4-3 Top of Molded BOC Type BGA 18
Figure 4-4 Flip-Chip (Bumped Die) on BGA Substrate .. 19
Figure 4-5 JEDEC Standard Format for Package-on-Package Components 22
Figure 4-6 Polymer Coated Sphere Interconnection 23
Figure 4-7 Plastic Ball Grid Array (BGA) Package 24
Figure 4-8 Cross-Section of a Thermally Enhanced Ceramic Ball Grid Array (CBGA) Package 25
Figure 4-9 Ceramic Ball Grid Array (CBGA) Package with Molded Polymer Encapsulation 25
Figure 4-10 Ceramic-Based Column Grid Array (CCGA) Package 26
Figure 4-11 Polyimide Film-Based Lead-Bond µBGA Package Substrate Furnishes Close Coupling Between Die Pad and Ball Contact 26
Figure 4-12 Comparing In-Package Circuit Routing Capability of the Single Metal Layer Tape Substrate to Two Metal Layer Tape Substrate 26
Figure 4-13 Single Package Die-Stack BGA 27
Figure 4-14 Custom Eight Die (Flip-Chip and Wire-Bond) SiP Assembly 27
Figure 4-15 Folded Multiple-Die BGA Package 27
Figure 4-16 Eight Layer Ball Stack Package 27
Figure 4-17 SO-DIMM Memory Card Assembly 28
Figure 4-18 Folded and Stacked Multiple Die BGA Package 28
Figure 4-19 Package-on-Package Assembly 28
Figure 4-20 Semiconductors Packaged with µPILR Substrate 29
Figure 4-21 Solder Interface Between µPILR-Configured Substrate Interposer and Circuit Board 29
Figure 4-22 BGA Connector 29
Figure 4-23 PGA Socket Pins 30
Figure 4-24 PGA Socket With and Without Pick and Place Cover 30
Figure 4-25 LGA Contact Pin 31
Figure 4-26 LGA Socket With and Without Pick and Place Cover 31
Figure 4-27 Example of Missing Balls on a BGA Component 35
Figure 4-28 Example of Voids in Eutectic Solder Balls at Incoming Inspection 35
Figure 4-29 Examples of Solder Ball/Land Surface Conditions 35
Figure 4-30 Establishing BGA Coplanarity Requirement ... 36

Currently in preview, click buy full version

Figure 4-31 Ball Contact Positional Tolerance 36
Figure 5-1 Examples of Different Build-Up Constructions 38
Figure 5-2 Expansion Rate Above T_g 40
Figure 5-3 Hot Air Solder Level (HASL) Surface Topology Comparison 42
Figure 5-4 Black Pad Related Fracture Showing Crack Between Nickel & Ni-Sn Intermetallic Layer .. 43
Figure 5-5 Crack Location for a) Black Pad Related Failure and (b) Interfacial Fracture When Using ENIG Surface Finish 43
Figure 5-6 Typical Mud Crack Appearance of Black Pad Surface 44
Figure 5-7 A Large Region of Severe Black Pad with Corrosion Spikes Protruding into Nickel Rich Layer through Phosphorus Rich Layer Underneath Immersion Gold Surface 44
Figure 5-8 Gold Embrittlement 45
Figure 5-9 Graphic Depiction of Electroless Nickel/ Electroless Palladium/Immersion Gold 45
Figure 5-10 Graphic Depiction of Directed Immersion Gold 45
Figure 5-11 Example of Micro Voids 46
Figure 5-12 Via Plug Methods 49
Figure 5-13 Metal Core Board Construction Examples 50
Figure 6-1 BGA Alignment Marks 51
Figure 6-2 Solder Lands for BGA Components 53
Figure 6-3 Metal Defined Land Attachment Profile 53
Figure 6-4 Solder Mask Stress Concentration 53
Figure 6-5 Solder Joint Geometry Contrast 54
Figure 6-6 Good/Bad Solder Mask Design 55
Figure 6-7 Examples of Metal-Defined Land 55
Figure 6-8 Quadrant Dog Bone BGA Pattern 55
Figure 6-9 Square Array 56
Figure 6-10 Rectangular Array 56
Figure 6-11 Depopulated Array 56
Figure 6-12 Square Array with Missing Balls 56
Figure 6-13 Interspersed Array 57
Figure 6-14 Conductor Routing Strategy 58
Figure 6-15 BGA Dogbone Land Pattern Preferred Direction for Conductor Routing 59
Figure 6-16 Preferred Screw and Support Placement 59
Figure 6-17 Connector Screw Support Placement 59
Figure 6-18 Cross Section of 0.75 mm Ball with Via-in-Pad Structure (Indent to the Upper Left of the Ball is an Artifact.) 59
Figure 6-19 Cross Section of Via-in-Pad Design Showing Via Cap and Solder Ball 60
Figure 6-20 Via-in-Pad Process Descriptions 60
Figure 6-21 Microvia Example 61
Figure 6-22 Microvia-in-Pad Voiding 61
Figure 6-23 Ground or Power BGA Connection 61
Figure 6-24 Example of Top Side Reflow Joints 62
Figure 6-25 Example of Wave Solder Temperature Profile of Topside of Mixed Component Assembly 62
Figure 6-26 Heat Pathways to BGA Solder Joint During Wave Soldering 63
Figure 6-27 Methods of Avoiding BGA Topside Solder Joint Reflow 63
Figure 6-28 An Example of a Side Contact Made with a Tweezers Type Contact 64
Figure 6-29 Pogo-Pin Type Electrical Contact Impressions on the Bottom of a Solder Ball 65
Figure 6-30 Area Array Land Pattern Testing 66
Figure 6-31 Board Panelization 69
Figure 6-32 Comb Pattern Examples 70
Figure 6-33 Heat Sink Attached to a BGA with an Adhesive 72
Figure 6-34 Heat Sink Attached to a BGA with a Clip that Hooks onto the Component Substrate 72
Figure 6-35 Heat Sink Attached to a BGA with a Clip that Hooks into a Through-Hole on the Printed Circuit Board 72
Figure 6-36 Heat Sink Attached to a BGA with a Clip that Hooks onto a Stake Soldered in the Printed Circuit Board 73
Figure 6-37 Heat Sink Attached to a BGA by Wave Soldering Its Pins in a Through-Hole in the Printed Circuit Board 73
Figure 7-1 Aspect and Area Ratios for Complete Paste Release 77
Figure 7-2 High Lead and Eutectic Solder Ball and Joint Comparison 78
Figure 7-3 Example of Peak Reflow Temperatures at Various Locations at or Near a BGA 79
Figure 7-4 Schematic of Reflow Profile for Tin/Lead Assemblies 81
Figure 7-5 An Example of Tin/Lead Profile with Multiple Thermocouples 81
Figure 7-6 Schematic of Reflow Profile for Lead-Free Assemblies 81
Figure 7-7 Examples of Lead-Free Profiles with Soak (Top) and Ramp to Peak (Bottom) with Multiple Thermocouples. The Profiles with Soak Tend to Reduce Voids in BGAs. 82
Figure 7-8 Locations of Thermocouples on a Board with Large and Small Components 82
Figure 7-9 Recommended Locations of Thermocouples on a BGA 82
Figure 7-10 Effect of Having Solder Mask Relief Around the BGA Lands of the Board 86
Figure 7-11 Map of Underfill Adhesive Usage for BGA and Other Packages 88
Figure 7-12 Flow of Underfill Between Two Parallel Surfaces 88
Figure 7-13 Examples of Underfill Voids - small, medium and large; upper left, lower left and left of solder balls, respectively 89

Figure 7-14 Example of Partial Underfill - package was pulled from the PCB and dark underfill can be seen in the corners 89
Figure 7-15 Corner Applied Adhesive 90
Figure 7-16 Critical Dimension for Application of Prereflow Corner Glue 90
Figure 7-17 Typical Corner Glue Failure Mode in Shock if Glue Area is Too Low - Solder Mask Rips Off Board and Does Not Protect the Solder Joints 90
Figure 7-18 Fundamentals of X-Ray Technology 92
Figure 7-19 X-Ray Example of Missing Solder Balls 92
Figure 7-20 X-ray Example of Voiding in Solder Ball Contacts 92
Figure 7-21 Manual X-Ray System Image Quality 92
Figure 7-22 Example of X-Ray Pin Cushion Distortion and Voltage Blooming 93
Figure 7-23 Transmission image (2D) 93
Figure 7-24 Tomosynthesis image (3D) 93
Figure 7-25 Laminographic Cross-Section Image (3D) 94
Figure 7-26 Transmission Example 94
Figure 7-27 Oblique Viewing Board Tilt 94
Figure 7-28 Oblique Viewing Detector Tilt 94
Figure 7-29 Top Down View of FBGA Solder Joints 95
Figure 7-30 Oblique View of FBGA Solder Joints 95
Figure 7-31 Tomosynthesis 96
Figure 7-32 Scanned Beam X-Ray Laminography 96
Figure 7-33 Scanning Acoustic Microscopy 97
Figure 7-34 Endoscope Example 98
Figure 7-35 Lead-Free 1.27 mm Pitch BGA Reflowed in Nitrogen and Washed Between SMT Passes 98
Figure 7-36 Lead-Free BGA Reflowed in Air and Washed Between SMT Passes 98
Figure 7-37 Engineering Crack Evaluation Technique 99
Figure 7-38 A Solder Ball Cross Sectioned Through a Void in the Solder Ball 100
Figure 7-39 Cross-Section of a Crack Initiation at the Ball/Pad Interface 100
Figure 7-40 No Dye Penetration Under the Ball 100
Figure 7-41 Corner Balls have 80-100% Dye Penetration Which Indicate a Crack 100
Figure 7-42 Small Voids Clustered in Mass at the Ball-to-Land Interface 102
Figure 7-43 Typical Size and Location of Various Types of Voids in a BGA Solder Joint 103
Figure 7-44 X-Ray Image of Solder Balls with Voids at 50 kV (a) and 60 kV (b) 104
Figure 7-45 Examples of Suggested Void Protocols 105
Figure 7-46 Example of Voided Area at Land and Board Interface 108
Figure 7-47 X-Ray Image Showing Uneven Heating 110
Figure 7-48 X-Ray Image at 45° Showing Insufficient Heating in One Corner of the BGA 110
Figure 7-49 Example of Head-on-Pillow Showing Ball and Solder Paste have not Coalesced 110
Figure 7-50 Head-on-Pillow Process Sequence Occurrences 111
Figure 7-51 HoP Due to High Package Warpage 111
Figure 7-52 Example of Liquidus Time Delay 111
Figure 7-53 Solder Particles on Board Noncoalesced After Reflow 111
Figure 7-54 Hanging Ball Examples 112
Figure 7-55 X-Ray Image of Popcorning 112
Figure 7-56 X-Ray Image Showing Warpage in a BGA .. 113
Figure 7-57 BGA/Assembly Shielding Examples 114
Figure 8-1 BGA Solder Joint of Eutectic Tin/Lead Solder Composition Exhibiting Lead Rich (Dark) Phase and Tin Rich (Light) Phase Grains ... 120
Figure 8-2 Socket BGA Solder Joints of SnAgCu Composition, Showing the Solder Joint Comprised of 6 Grains (Top Photo) and a Single Grain (Bottom Photo). 120
Figure 8-3 Thermal-Fatigue Crack Propagation in Eutectic Tin/Lead Solder Joints in a CBGA Module 120
Figure 8-4 Thermal-Fatigue Crack Propagation in Sn-3.8Ag-0.7Cu Joints in a CBGA Module 120
Figure 8-5 Incomplete Solder Joint Formation for 1% Ag Ball Alloy Assembled at Low End of Typical Process Window 122
Figure 8-6 Solder Joint Failure Due to Silicon and Board CTE Mismatch 123
Figure 8-7 Grainy Appearing Solder Joint 124
Figure 8-8 Nonsolderable Land (Black Pad) 124
Figure 8-9 Land Contamination (Solder Mask Residue) 124
Figure 8-10 Solder Ball Drop 124
Figure 8-11 Missing Solder Ball 125
Figure 8-12 Example of Dynamic Warpage of Flip Chip BGA Packages and PCBs 125
Figure 8-13 Example of a Severely Warped BGA Package and PCB After Reflow Soldering in an Un-Optimized SMT Process 125
Figure 8-14 Examples of Acceptable Convex Solder Joints with Solder Joint Surface Tangents Shown in the Top Left Photo 126
Figure 8-15 Example of an Acceptable Columnar Solder Joint 126
Figure 8-16 Two Examples of Pad Cratering (Located at Corner of BGA) 127
Figure 8-17 Pad Crater Under 1.0 mm Pitch Lead-Free Solder Ball. Crack in Metal Trace Connected to the Land is Clear; However, the Pad Crater is Difficult to See in Bright Field Microscopy. 127
Figure 8-18 Cross-Section Photographs Illustrating Insufficient Melting of Solder Joints During Reflow Soldering. These Solder Joints are Located Below the Cam of a Socket. 128
Figure 8-19 Solder Mask Influence 129

Figure 8-20 Reliability Test Failure Due to Very Large Void 129
Figure 8-21 Comparison of a Lead-Free (SnAgCu) and Tin/Lead (SnPb) BGA Reflow Soldering Profiles 132
Figure 8-22 Endoscope Photo of a SnAgCu BGA Solder Ball 133
Figure 8-23 Comparison of Reflow Soldering Profiles for Tin/Lead, Backward Compatibility and Total Lead-Free Board Assemblies 134
Figure 8-24 Micrograph of a cross-section of a BGA SnAgCu solder ball, assembled onto a board with tin/lead solder paste using the standard tin/lead reflow soldering profile. The SnAgCu solder ball does not melt; black/grey interconnecting fingers are lead-rich grain boundaries; rod shape particles are Ag3Sn IMCs; grey particles are Cu6Sn5 IMCs. 134
Figure 8-25 Micrograph of a cross-section of a BGA SnAgCu solder ball, assembled onto a board with tin/lead solder paste using a backward compatibility reflows soldering profile. The SnAgCu solder ball has melted. 134
Figure A-1 Typical Flow Diagram for Void Assessment 151
Figure A-2 Voids in BGAs with Crack Started at Corner Lead 155
Figure A-3 Void Diameter Related to Land Size 155

Tables

Table 3-1 Multichip Module Definitions 6
Table 3-2 Number of Escapes vs. Array Size on Two Layers of Circuitry 6
Table 3-3 Potential Plating or Component Termination Material Properties 10
Table 3-4 Example of Semiconductor Cost Predictions 12
Table 4-1 JEDEC Standard JEP95-1/5 Allowable Ball Diameter Variations for FBGA 20
Table 4-2 Ball Diameter Sizes for PBGAs 20
Table 4-3 Future Ball Size Diameters for DSPBGAs 21
Table 4-4 Land Size Approximation 21
Table 4-5 Land-to-Ball Calculations for Current and Future BGA Packages (mm) 22
Table 4-6 Examples of JEDEC Registered BGA Outlines 22
Table 4-7 Pb-Free Alloy Variations 24
Table 4-8 IPC-4101C FR-4 Property Summaries - Specification Sheets Projected to Better Withstand Lead-Free Assembly 32
Table 4-9 Typical Properties of Common Dielectric Materials for BGA Package Substrates 34
Table 4-10 Moisture Classification Level and Floor Life 36
Table 5-1 Environmental Properties of Common Dielectric Materials 39
Table 5-2 Key Attributes for Various Board Surface Finishes 41
Table 5-3 Via Filling/Encroachment to Surface Finish Process Evaluation 48
Table 5-4 Via Fill Options 50
Table 6-1 Number of Conductors Between Solder Lands for 1.27 mm Pitch BGAs 52
Table 6-2 Number of Conductors Between Solder Lands for 1.0 mm Pitch BGAs 52
Table 6-3 Maximum Solder Land to Pitch Relationship 53
Table 6-4 Escape Strategies for Full Arrays 57
Table 6-5 Conductor Routing - 1.27 mm Pitch 58
Table 6-6 Conductor Routing - 1.0 mm Pitch 58
Table 6-7 Conductor Routing - 0.8 mm Pitch 58
Table 6-8 Conductor Routing - 1.27 mm Pitch 58
Table 6-9 Conductor Routing - 1.0 mm Pitch 58
Table 6-10 Conductor Routing - 0.8 mm Pitch 58
Table 6-11 Effects of Material Type on Conduction 71
Table 6-12 Emissivity Ratings for Certain Materials 71
Table 7-1 Particle Size Comparisons 76
Table 7-2 Example of Solder Paste Volume Requirements for Ceramic Array Packages 78
Table 7-3 Profile Comparison Between SnPb and SAC Alloys 80
Table 7-4 Inspection Usage Application Recommendations 91
Table 7-5 Field of View for Inspection 96
Table 7-6 Void Classification 103
Table 7-7 Ball-to-Void Size Image - Comparison for Various Ball Diameters 105
Table 7-8 C=0 Sampling Plan (Sample Size for Specific Index Value*) 106
Table 7-9 Repair Process Temperature Profiles for Tin Lead Assembly 116
Table 7-10 Repair Process Temperature Profiles for Lead-Free Assemblies 116
Table 8-1 Tin/Lead Component Compatibility with Lead-Free Reflow Soldering 121
Table 8-2 Typical Stand-Off Heights for Tin/Lead Balls (in mm) 128
Table 8-3 Common Solders, Their Melting Points, Advantages and Drawbacks 130
Table 8-4 Comparison of Lead-Free Solder Alloy Compositions in The Sn-Ag-Cu Family Selection by Various Consortia 131
Table 8-5 Types of Lead-Free Assemblies Possible 133
Table 8-6 Accelerated Testing for End Use Environments 137
Table A-1 Corrective Action Indicator for Lands used with 1.5, 1.27 or 1.0 mm Pitch 152
Table A-2 Corrective Action Indicator for Lands used with 0.8, 0.65 or 0.5 mm Pitch 153
Table A-3 Corrective Action Indicator for Microvia in Pad Lands used with 0.5, 0.4 or 0.3 mm Pitch 154

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Design and Assembly Process Implementation for BGAs

1 SCOPE

This document describes the design and assembly challenges for implementing Ball Grid Array (BGA) and Fine Pitch BGA (FBGA) technology. The effect of BGA and FBGA on current technology and component types is addressed, as is the move to lead-free assembly processes. The focus on the information contained herein is on critical inspection, repair, and reliability issues associated with BGAs. Throughout this document the word ''BGA'' can mean all types and forms of ball/column/bump/pillar grid array packages.

1.1 Purpose The target audiences for this document are managers, design and process engineers, and operators and technicians who deal with the electronic assembly, inspection, and repair processes. The purpose is to provide useful and practical information to those who are using BGAs, those who are considering BGA implementation and companies who are in the process of transition from standard tin/lead reflow processes to those that use lead-free materials.

1.2 Intent This document, although not a complete recipe, identifies many of the characteristics that influence the successful implementation of a robust assembly process. In many applications, the variation between assembly methods and materials is reviewed with the intent to highlight significant differences that relate to the quality and reliability of the final product. The accept/reject criteria for BGA assemblies, used in contractual agreements, is established by J-STD-001 and IPC-A-610.

An additional challenge in implementing BGA assembly processes, along with other types of components, is the need to meet the legislative directives that declare certain materials as hazardous to the environment. The requirements to eliminate these materials from electronic assemblies have caused component manufacturers to rethink the materials used for encapsulation, the plating finishes on the components and the metal alloys used in the assembly attachment process.

2 APPLICABLE DOCUMENTS

2.1 IPC[1]

J-STD-001 Requirements for Soldered Electrical and Electronic Assemblies

J-STD-020 Handling Requirements for Moisture Sensitive Components

J-STD-033 Standard for Handling, Packing, Shipping and Use of Moisture/Reflow Sensitive Surface Mount Devices

J-STD-609 Marking and Labeling of Components, PCBs and PCBAs to Identify Lead (Pb), Pb-Free and Other Attributes

IPC-T-50 Terms and Definitions for Printed Boards and Printed Board Assemblies

IPC-D-279 Design Guidelines for Reliable Surface Mount Technology Printed Board Assemblies

IPC-D-356 Bare Substrate Electrical Test Information in Digital Form

IPC-A-600 Acceptability of Printed Boards

IPC-A-610 Acceptability of Electronic Assemblies

IPC-SM-785 Guidelines for Accelerated Reliability Testing of Surface Mount Attachments

IPC-1601 Printed Board Handling and Storage Guidelines

IPC-2221 Generic Standard on Printed Board Design

IPC-2581 Generic Requirements for Printed Board Assembly Products Manufacturing Description Data and Transfer Methodology

IPC-2611 Generic Requirements for Electronic Product Documentation

IPC-2614 Sectional Requirements for Board Fabrication Documentation

IPC-2616 Sectional Requirements for Assembly Documentation

IPC-4554 Specification for Immersion Tin Plating for Printed Circuit Boards

IPC-4761 Design Guide for Protection of Printed Board Via Structures

IPC-7093 Design and Assembly Process Implementation for Bottom Termination Components

IPC-7094 Design and Assembly Process Implementation for Flip Chip and Die Size Components

IPC-7351 Generic Requirements for Surface Mount Design and Land Pattern Standard

IPC-7525 Stencil Design Guidelines

1. www.ipc.org