Exponent®
Engineering & Scientific Consulting

Qiming Zhang, Ph.D.

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Professional Profile

Dr. Zhang has comprehensive experience in the development cycles and field-service cycles of consumer electronic products. On the macroscopic level, he is proficient in product safety and reliability regulation and compliance, involving regional requirements of North America, European Union, Britain, Asia, and China.

His expertise includes Design for Safety, Manufacturability, and Reliability (DFX) consulting on electronic products, including design and structure optimization and material selection, life-prediction of field service, harsh environmental assessment, durability testing, high-power safety involving high-power electrics and power adapters, reliability and quality control systems, process optimization and cost reduction, incident investigation, and reverse engineering.

Dr. Zhang is also an electronic packaging and PCBA specialist with over 10 years of training and industry experience. He has industry experience in design, manufacturing, testing, reliability engineering, stress and thermal analysis, failure analysis, and root cause analysis of electronic devices at the PCBA level and component level. His experience covers solder joint reliability, wave-soldering and surface mounting technology (SMT), inter-metallic compound (IMC) of Sn-Ag-Cu eutectic solder alloys, electrochemical migration and dendrite/whiskers/CAF growth, electronic architectures involving 2.5D/3D integration, ball grid array (BGA) and land grid array (LGA) packaging, package on package (PoP) integration, system in package (SiP), chip on board (CoB), fan-out and fan-in package, wafer-level packaging (WLP), redistribution layer (RDL), printed circuit board assembly (PCBA), pad finishing and plating, conformal coatings, backplate level assembly, solder paste and flux, discrete electronic components, LED, flexible printed circuit (FPC) , wire-bonding and interconnections, IPC/JEDEC/JEITA standards, USB-IF regulations, thermal interface material and thermal management, and adhesive bonding techniques.

Dr. Zhang has led many industrial projects involving industrial and household electronics, electronic packaging, and PCB/PCBA field, including compliance and regulation consulting, DFX inspection and review, Failure mode and effects analysis (FMEA) review, process optimization, quality control on mass production, cost reduction, thermo-mechanical coupling testing/simulation, and material characterization. He has years of factory experience in supporting the new product introduction (NPI) from prototype to ramp and mass-production. He has also provided factory audits and professional training courses to companies manufacturing electronic products and packaging. He also supported many cases of international litigation, arbitration, and patent dispute in the technical field.

Dr. Zhang is also proficient with mechanical and thermal finite element analysis (FEA) analysis, laboratory testing techniques including standard and customized mechanical and thermal testing, material characterization involving DMA/TMA/DSC/TGA, surface analytical techniques involving SEM/FIB/AFM/Optical Profiler, harsh environmental testing, and electrical testing.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Hong Kong University of Science and Tech, 2017

M.Sc., Mechanical Engineering, Hong Kong University of Science and Tech, 2012

B.Eng., Mechanical Design, Shenyang Agricultural University, China, 2011

Outstanding Paper Award (1st Place) in International Conference of Electronic Packaging Technology (ICEPT) 2016, “Correlation of Board and Joint Level Test Methods with Strain Dominant Failure Criteria for Improving the Resistance to Pad Cratering”.

Journal of Electronic Packaging (JEP) reviewer of the year 2021 (Awarded at ASME InterPack 2021)

Licenses and Certifications

SOLIDWORKS Certificate in Mechanical Design

Prior Experience

Senior Engineer I, Mechanical, Design Engineering, Artesyn Embedded Technologies, Hong Kong, China, 2017-2018.

Post-doctoral Researcher/Research and Teaching Assistant, Center of Advanced Microsystems Packaging, The Hong Kong University of Science & Technology, Hong Kong, China, 2013-2017.

Structural Engineer, Center Research Lab, Shenyang Machine Tool Co. Ltd., Shenyang City, Liaoning, China, 2012

Professional Affiliations

IEEE Senior Member

IEEE Electronic Packaging Society

IEEE Product Safety Engineering Society

Languages

English

Mandarin Chinese

Patents

“Cold Pin Pull Test Method for Pad Cratering Evaluation”, Chinese Patent. CN 103293099 A

Publications

Qiming Zhang, Babak Kondori, Xing Qiu, Jeffry C.C. Lo, S.W. Ricky Lee, Failures in Soldering, Analysis and Prevention of Component and Equipment Failures, Vol 11A, ASM Handbook, Edited By Brett A. Miller, Roch J. Shipley, Ronald J. Parrington, Daniel P. Dennies, ASM International, 2021, p 326–337.

Q. Zhang, and S. W. Ricky Lee. (December 20, 2021). "Prediction of Board Level Pad Cratering Strength

with the Pre-Defined Failure Criteria from Joint Level Testing." Journal of Electronic Packaging (2021).

Q. Zhang, and S. W. Ricky Lee. "Assessment of Fatigue Induced Pad Cratering With a Universal Expression of Printed Circuit Board Fatigue Resistance." Journal of Electronic Packaging 142.2 (2020).

Q. Zhang, Nareg Sinenian, and Ray Huang. "Investigations on Electrolytic Capacitors to Improve Reliability under Assembly-Level Impact Conditions." 2019 20th International Conference on Electronic Packaging Technology (ICEPT). IEEE, 2019.

Q. Zhang, et al. "Correlation of Warpage Distribution with the Material Property Scattering for Warpage Range Prediction of PBGA Components." Journal of Electronic Packaging (Dec. 2018), 140(4).

Q. Zhang, et al. "Determination of a Meaningful Warpage Acceptance Criterion for Large PBGA Components through the Correlation with Scattering in Material Properties." In 2018 IEEE 68th Electronic Components and Technology Conference (ECTC), pp. 718-723.

Q. Zhang, Jeffery C.C. Lo, and S.W. Ricky Lee, "Pad cratering based failure criterion for the life prediction of board level cyclic bending test." in 2017 IEEE 67rd Electronic Components and Technology Conference (ECTC), 2017, pp. 448-455.

Q. Zhang, Jeffery C.C. Lo, and S.W. Ricky Lee, "Modeling of residual strain in BGA-PCB assemblies for pad cratering control." Thermal and Thermomechanical Phenomena in Electronic Systems (ITherm), 2017 16th Intersociety Conference on. IEEE, 2017, pp. 1153-1160.

Q. Zhang, Jeffery C.C. Lo, and S.W. Ricky Lee, "Correlation of board and joint level test methods with strain dominant failure criteria for improving the resistance to pad cratering." Electronic Packaging Technology (ICEPT), 2016 17th International Conference on. IEEE, 2016, pp. 1-6.

Q. Zhang et al, "Characterization of orthotropic CTE of BT substrate for PBGA warpage evaluation." Thermal and Thermomechanical Phenomena in Electronic Systems (ITherm), 2016 15th Intersociety Conference on. IEEE, 2016, pp. 1312-1319.

Q. Zhang et al, "Assessment of solder pad cratering strength using cold pin pull test method with pre-fabricated pin arrays," in 2013 IEEE 63rd Electronic Components and Technology Conference (ECTC), 2013, pp. 1788-1793.

Q. Zhang et al, "Development of innovative cold pin pull test method for solder pad crater evaluation," in Electronic Materials and Packaging (EMAP), 2012 14th International Conference On, 2012, pp. 1-4.

F. Le, S.W. Ricky Lee, and Q. Zhang, "3D chip stacking with through silicon-vias (TSVs) for vertical interconnect and underfill dispensing." Journal of Micromechanics and Microengineering 27.4 (2017): 045012.

Q. Zhang (2017). Strain Dominant Failure Criteria for Board Level Pad Cratering under Over-stress and Fatigue Loading (Doctoral dissertation, Hong Kong University of Science and Technology).

Presentations

Invited Talk of Exponent Hong Kong 2019 One-Day Technical Seminar Series: Solving Multidisciplinary Consumer Product Development Challenges, “Reliability Engineering of Consumer and Industrial Electronics: From the Design, Manufacturing to Testing”.

Invited Talk of 2019 20th International Conference on Electronic Packaging Technology, "Investigations on Electrolytic Capacitor to Improve the Reliability under Assembly Level Impact Condition".

Invited Talk of Shenzhen Institutes of Advanced Technology (SIAT) at 2019 Mainland, Taiwan, Hong

Kong and Macau Key Technology Forum of Electronic Packaging, “Failure Analysis of Consumer Electronics”.

Invited Talk of Huawei 2017 Technology Forum at Shanghai, “Strain Dominant Failure Criteria for Board Level Pad Cratering under Over-stress and Fatigue Loading”.

Invited Talk of The Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems (ITHERM) 2017, “Modeling of Residual Strain in BGA-PCB Assemblies for Pad Cratering Control”.

Peer Reviews

Reviewer of Journal of Electronic Packaging, American Society of Mechanical Engineers (ASME)