

**UNITED STATES PATENT AND TRADEMARK OFFICE**

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**BEFORE THE PATENT TRIAL AND APPEAL BOARD**

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MICRON TECHNOLOGY, INC.,  
Petitioner,

v.

VERVAIN, LLC,  
Patent Owner.

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Case No.: IPR2021-01547  
U.S. Patent No. 8,891,298  
Original Issue Date: November 18, 2014

Title: LIFETIME MIXED LEVEL NON-VOLATILE MEMORY SYSTEM

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**REPLY DECLARATION OF DR. DAVID LIU**

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I, David Liu, declare as follows:

**I. INTRODUCTION**

1. I have been retained by Micron Technology, Inc. (“Micron”) as an independent expert consultant in this proceeding before the United States Patent and Trademark Office (“PTO”). I am not an employee of Micron or any affiliate or subsidiary of Micron.

2. My opinions and the bases for my opinions are set forth below.

3. I am being compensated at \$550 per hour for my work, plus reimbursement for any reasonable expenses. My compensation is based solely on the amount of time that I devote to activity related to this case and is in no way contingent on the nature of my findings, the presentation of my findings in testimony, or the outcome of this or any other proceeding. I have no other financial interest in this proceeding.

**II. EDUCATION BACKGROUND, PROFESSIONAL EXPERIENCE, AND OTHER QUALIFICATIONS**

4. My education, background, and professional qualifications are set forth in Paragraphs 5-14 of the previous declaration that was submitted in connection with this proceeding (which I understand has been designated as Exhibit 1009). My CV is included as Exhibit 1058.

### III. ASSIGNMENT AND MATERIALS CONSIDERED

5. I have been asked to provide some additional opinions and elaboration regarding the state of the art and what one of ordinary skill in the art would have known as of the effective filing date of the 298 patent.

6. I reserve the right to amend and supplement this declaration in light of additional evidence, arguments, or testimony presented during this IPR or related proceedings on the 298 patent.

7. In forming the opinions set forth in this declaration, I have considered and relied upon my education, knowledge of the relevant field, knowledge of scientific and engineering principles, and my experience. To the extent applicable to the opinions I render here, I have also reviewed and considered Patent Owner's Response in this proceeding, the materials listed in my prior declaration (Exhibit 1009), along with the following additional materials:

<b>Exhibit</b>	<b>Description</b>
1059	Deposition Transcript of Sunil Khatri (September 1, 2022) [IPR2021-01547, -01548 and -01549]
1061	U.S. Patent No. 8,130,554 ("Linnell")
1062	U.S. Patent No. 7,917,709 ("Gorobets III")
1064	Byung-Woo Nam, Gap-Joo Na, and Sang-Won Lee, "A Hybrid Flash Memory SSD Scheme for Enterprise Database Applications"

Exhibit	Description
1065	Yuan-Hao Chang, Jen-Wei Hsieh, Tei-Wei Kuo, “Improving Flash Wear-Leveling by Proactively Moving Static Data”
1066	Muthukumar Murugan, “Rejuvenator: A Static Wear Leveling Algorithm for NAND Flash Memory with Minimized Overhead”
2014	Declaration of Sunil Khatri in Support of Patent Owner’s Response in IPR 2021-01547

#### IV. UNDERSTANDING OF THE LAW

8. Paragraphs 19-34 of my prior declaration (Ex. 1009) included a section discussing my understanding of the law. I am not an attorney, but I have been instructed in and applied the law as described in my prior declaration.

#### V. LEVEL OF SKILL IN THE ART

9. Paragraphs 35-38 of my prior declaration (Ex. 1009) include my understanding of the level of skill in the art. I understand that Patent Owner adopted Petitioner’s definition of the level of skill in the art. I have applied the same definition of an ordinarily skilled artisan here.

#### VI. THE 298 PATENT’S EFFECTIVE FILING DATE

10. As in my prior declaration, my opinions in this declaration are formed from the perspective of a person of ordinary skill in the art as of July 19, 2011, including both the knowledge of a person of ordinary skill in the art at that time as well as how a person of ordinary skill in the art would understand the prior art.

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