UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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LG ELECTRONICS, INC.,

PETITIONER,

V.

BELL NORTHERN RESEARCH, LLC,

PATENT OWNER.

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Case No. IPR2019-00319
U.S. Patent No. 7,039,435

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DECLARATION OF MARK HORENSTEIN, PH.D.

I, Mark Horenstein, Ph.D., hereby declare as follows:

I. INTRODUCTION

1. I am over the age of eighteen (18) years and otherwise competent to make this declaration.

2. I have been retained as an expert witness on behalf of Bell Northern Research, LLC for the above-captioned *inter partes* review ("IPR"). I understand that the petition for *inter partes* review involves U.S. Patent No. 7,039,435 ("the '435 patent"), which was filed on September 28, 2001. The '435 Patent names Richard McDowell and Philip Mooney as co-inventors. The '435 Patent issued on May 2, 2006.

3. I make this declaration based on my personal knowledge, educational background and training, consideration of the materials I discuss herein, and my expert opinions.

4. I am being compensated at a rate of $325 per hour for my time in this matter. My compensation does not depend on the outcome of this proceeding and I have no financial interest in its outcome.

5. In preparing this Declaration, I have reviewed and considered the '435 Patent, the '435 Patent prosecution history, and each of the documents cited herein, and I have considered them in light of general knowledge in the art in the time frame of September 28, 2001. In formulating my opinions, I have

relied upon my experience, education and knowledge as they relate to the relevant art. I also have considered the viewpoint of a person of ordinary skill in the art in the time frame of the filing date of the '435 patent.

II.   BACKGROUND AND QUALIFICATIONS

6.   I am a Professor of Electrical Engineering in the Department of Electrical and Computer Engineering (ECE) at Boston University where I have been a faculty member since 1979. I also have held various other positions at Boston University, including the Associate Dean for Graduate Programs and Research for the College of Engineering (1999-2007), Associate Chair for Undergraduate Programs for the ECE Department (1990 – 1998; 2012 – 2015), as well as appointments at the ranks of Associate Professor (1985-2000) and Assistant Professor (1979-1985).

7.   I have a Ph.D. in Electrical Engineering from the Massachusetts Institute of Technology (MIT) which I earned in 1978. I also hold an M.S. degree in Electrical Engineering from the University of California at Berkeley (1975), and an S.B. degree in Electrical Engineering from MIT (1973).

8.   I am a Life Fellow of the Institute of Electrical and Electronic Engineers (IEEE, the primary professional organization for engineers in electrical, computer, and related fields of engineering). I also am an Engineer certified by the National Association of Radio and Telecommunications

Engineers (NARTE). My primary areas of expertise are in applied electromagnetics, radio and communication systems, electric, magnetic, and electromechanical devices, electric-power systems, electronic circuits, power electronics, and micro-electromechanical systems (MEMS).

9.   I am the author of several textbooks, including *Microelectronic Circuits and Devices, 2nd Ed.* (Prentice-Hall 1996) and *Design Concepts for Engineers, 5th Ed.* (Pearson Education, 2016). I have authored book chapters in two reference books related to applied electromagnetics. I have authored or co-authored over 70 journal articles on a variety of topics in my fields of expertise, and approximately 100 conference papers. I have advised several Ph.D. students performing research in my fields of expertise; these students have gone on to hold various positions in industry and academia. I am a named inventor on five U.S. patents relating to my broad areas of expertise.

10.   Over the several decades that I have been employed as a faculty member at Boston University, I have developed and taught courses in electromagnetic waves, basic electronics, microcontrollers, power electronics, electromechanical energy conversion, robotics, and engineering design. I have been named "Teacher of the Year" in Electrical Engineering at Boston University four times.

11.   A more complete summary of my background, qualifications and professional experience and affiliations is set forth in my *curriculum vitae*, is simultaneously filed herewith as Exhibit 2004.

III.   LEGAL PRINCIPLES

12.   Claim Construction: I understand that the first step in performing a validity analysis of the patent claims is to interpret the meaning and scope of the claims by construing the terms and phrases found in those claims. I understand that a determination of the meaning and scope of the claims of the Patents-in-Suit is a matter of law. I have been informed that to determine the meaning of the claims, courts consider the intrinsic evidence, which includes the patent's claims, written description, prosecution history, materials incorporated by reference in the patent, and prior art cited in the patent or its prosecution history. Courts give claim terms their ordinary and accustomed meaning as understood by one of ordinary skill in the art at the time of the invention in the context of the entire patent. A patentee may also define his or her own terms or disclaim claim scope. The intrinsic record may also resolve ambiguous claim terms where the ordinary and accustomed meaning of the words used in the claims lack sufficient clarity to permit the scope of the claim to be ascertained from the words alone. However, particular embodiments and examples appearing in the specification will not generally be read into the

4

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