IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

AMERICAN GNC CORPORATION, Plaintiff, v. LG ELECTRONICS INC., LG ELECTRONICS U.S.A., INC., LG ELECTRONICS MOBILECOMM U.S.A., INC., and LG ELECTRONICS MOBILE RESEARCH U.S.A., LLC, Defendants.	Civil Action No. 2:17-cv-1119 JURY TRIAL DEMANDED

COMPLAINT

Plaintiff American GNC Corporation files this Complaint for patent infringement under the patent laws of the United States, Title 35 of the United States Code, against Defendants LG Electronics Inc., LG Electronics U.S.A., Inc., LG Electronics MobileComm U.S.A., Inc., and LG Electronics Mobile Research U.S.A., LLC (collectively "LG") and alleges as follows:

PARTIES

1. Plaintiff American GNC Corporation ("AGNC") is a California corporation with its principal place of business at 888 Easy Street, Simi Valley, California 93065 that specializes in inventing and applying advanced and innovative technologies to contemporary problems within the fields of Guidance, Navigation,

Control and Communications (GNCC), Inertial Sensors, Health Monitoring, Intelligent Processing, and Autonomous Robotics.

2. Defendant LG Electronics Inc. is a corporation duly organized and existing under the laws of the Republic of Korea, with its principal place of business at LG Twin Towers, 20 Yeouido-dong, Yeongdeungpo-gu, Seoul, Korea. On information and belief, LG Electronics Inc. can be served with process at that address.

3. Defendant LG Electronics U.S.A., Inc. is a corporation duly organized and existing under the laws of Delaware, with a place of business at 920 Sylvan Avenue, Englewood Cliffs, New Jersey 07632. LG Electronics U.S.A., Inc. can be served with process through its registered agent, United States Corporation Co, 211 East 7th Street, Suite 620, Austin, Texas 78701.

4. Defendant LG Electronics MobileComm U.S.A., Inc. is a corporation duly organized and existing under the laws of California, with a place of business at 10101 Old Grove Road, San Diego, California 92131. LG Electronics MobileComm U.S.A., Inc. can be served with process through its registered agent, Corporation Service Company (d/b/a CSC-Lawyers Incorporating Service Company) 211 East 7th Street, Suite 620, Austin, Texas 78701.

5. Defendant LG Electronics Mobile Research U.S.A., LLC is a company duly organized and existing under the laws of California, with a place of business at 10101 Old Grove Road, San Diego, California, 92131. LG Electronics Mobile Research U.S.A., LLC can be served with process through its registered agent, Corporation Service Company (d/b/a CSC - Lawyers Incorporating Service Company), 211 East 7th Street, Suite 620, Austin, Texas 78701.

6. LG makes, uses, imports, sells and offers for sale wireless mobile devices including smartphones, tablets, smart watches, and related applications and services.

7. LG is ranked by independent industry analysts as the third-largest supplier of mobile devices in the U.S.

JURISDICTION AND VENUE

8. This is a civil action for patent infringement arising under the Patent Laws of the United States, 35 U.S.C. § 1, *et seq*., and more particularly 35 U.S.C. § 271.

9. This Court has jurisdiction over the subject matter of this action under 28 U.S.C. §§ 1331 and 1338(a).

10. Each LG Defendant is subject to this Court's general personal jurisdiction pursuant to due process and/or the Texas Long Arm Statute, Tex. Civ. Prac. & Rem. Code § 17.042, due at least to its substantial business conducted in this District, including: (i) having solicited business in the State of Texas, transacted business within the State of Texas and attempted to derive financial benefit from residents of the State of Texas in this District, including benefits directly related to the instant patent infringement causes of action set forth herein; (ii) having placed its products and services into the stream of commerce throughout the United States and having been actively engaged in transacting business in Texas and in this District, and (iii) having committed the complained of tortious acts in Texas and in this District.

11. LG, directly and/or through subsidiaries and agents (including distributors, retailers, and others), makes, imports, ships, distributes, offers for sale, sells, uses, and advertises (including offering products and services through its website,

http://www.lg.com/us, as well as other retailers) its products and/or services in the United States, the State of Texas, and the Eastern District of Texas.

12. LG, directly and/or through its subsidiaries and agents (including distributors, retailers, and others), has purposefully and voluntarily placed one or more of its infringing products and/or services, as described below, into the stream of commerce with the expectation that they will be purchased and used by consumers in the Eastern District of Texas. These infringing products and/or services have been and continue to be purchased and used by consumers in the Eastern District of Texas. LG has committed acts of patent infringement within the State of Texas and, more particularly, within the Eastern District of Texas. LG Electronics U.S.A., Inc., LG Electronics MobileComm U.S.A., Inc., and LG Electronics Mobile Research U.S.A., LLC are registered with the Texas Secretary of State to conduct business in the State of Texas.

13. This Court's exercise of personal jurisdiction over LG is consistent with the Texas long-arm statute, Tex. Civ. Prac. & Rem. Code § 17.042, and traditional notions of fair play and substantial justice.

14. Venue is proper in this District under 28 U.S.C. §§ 1391 (b) and (c) and 1400(b). Defendants are subject to personal jurisdiction in this District, have transacted business in this District, and have committed acts of patent infringement in this District.

BACKGROUND ABOUT PLAINTIFF AGNC

15. AGNC was founded by Ching-Fang Lin, Ph.D. in 1986 as a California corporation. AGNC's headquarters are at 888 Easy Street, Simi Valley, California 93065. AGNC is the owner of record and assignee of 79 issued United States patents, including the Patents-in-Suit.

16. Dr. Lin previously received his doctorate in Computer, Information, and Control Engineering from the University of Michigan in Ann Arbor.

17. Dr. Lin authored over 400 technical publications and was responsible for over 100 patent application filings at AGNC, including as an inventor on each of the Patents-in-Suit**.**

18. Dr. Lin was responsible for over 1,000 government contract reports and led the effort to introduce over 30 Guidance, Navigation, Control and Communications (GNCC) products.

19. Dr. Lin's achievements and awards include: SBA Small Business Person of the Year 2002, NASA Space Act Award Recognition for Inventions and Scientific and Technical Exceptional Contributions, Multiple Multiyear NASA Innovative Invention Award, Donald P. Eckman Award Nominee for Outstanding Control Engineer, Nominee for the Mechanics and Control of Flight Award, among many others.

20. AGNC is an operating high technology company that specializes in inventing and applying advanced and innovative technologies to contemporary problems within the fields of Guidance, Navigation, Control and Communications (GNCC), Inertial Sensors, Health Monitoring, Intelligent Processing, and Autonomous Robotics.

21. Since its establishment in 1986, AGNC has been actively involved in pioneering efforts related to inertial sensors, interruption-free positioning, and INS/GNSS fusion technologies that AGNC has invented, which are disclosed in its extensive patent portfolio. AGNC made the world's first MEMS rate integrating gyroscope in 1999, setting the stage for development of its coremicro® IMU product series.

22. AGNC is also among the very first companies to patent micro-electromechanical (MEMS) Inertial Measurement Unit ("IMU") technology, which is commonly found in most handheld consumer electronics such as tablets and smartphones.

23. AGNC analyzed positioning technologies and led breakthrough efforts during the late 1990's for the fusion of inertial data with other sources.

24. AGNC's patented solutions are now found on consumer devices for applications such as indoor or urban navigation.

25. More information about Plaintiff and its products can be found at AGNC's website, www.americangnc.com.

26. As of the date of this complaint, AGNC has licensed its patents to four companies, including one direct competitor of LG.

27. Prior to filing this lawsuit, AGNC diligently attempted to resolve its claims against LG without litigation.

28. LG has refused to enter into a license agreement with AGNC.

THE PATENTS-IN-SUIT AND CLAIMS-IN-SUIT

29. AGNC is the owner of record and assignee of each of U.S. Patent Nos. 6,311,555; 6,415,227; 6,508,122; 6,516,283; 6,671,648; 6,697,758; and 6,792,353 (the "Patents-in-Suit").

30. AGNC had and has the exclusive right to sue and recover damages for infringement of the Patents-in-Suit during all relevant time periods.

31. On November 6, 2001, U.S. Patent No. 6,311,555 (the "'555 Patent") entitled "Angular Rate Producer with Microelectromechanical System Technology" was duly and legally issued by the United States Patent and Trademark Office ("USPTO").

32. On July 2, 2002, U.S. Patent No. 6,415,227 (the "'227 Patent") entitled "Enhanced Global Positioning System and Map Navigation Process" was duly and legally issued by the USPTO.

33. On January 21, 2003, U.S. Patent No. 6,508,122 (the "'122 Patent") entitled "Microelectromechanical System for Measuring Angular Rate" was duly and legally issued by the USPTO.

34. On February 4, 2003, U.S. Patent No. 6,516,283 (the "'283 Patent") entitled "Core Inertial Measurement Unit" was duly and legally issued by the USPTO.

35. On December 30, 2003, U.S. Patent No. 6,671,648 (the "'648 Patent") entitled "Micro Inertial Measurement Unit" was duly and legally issued by the USPTO.

36. On February 24, 2004, U.S. Patent No. 6,697,758 (the "'758 Patent") entitled "Processing Method for Motion Measurement" was duly and legally issued by the USPTO.

37. On September 14, 2004, U.S. Patent No. 6,792,353 (the "'353 Patent") entitled "Enhanced Inertial Measurement Unit/Global Positioning System Mapping and Navigation Process" was duly and legally issued by the USPTO.

38. AGNC asserts that LG has been and now is infringing, directly and by inducement, at least the following claims of the Patents-in-Suit in this District and elsewhere in the United States:

- '555 Patent - claim 49;
- '227 Patent – claims 1, 2, 3, and 36;
- '122 Patent – claim 1;
- '283 Patent – claims 1 and 3;

- ’648 Patent – claims 1 and 4;
- ’758 Patent – claim 1; and
- ’353 Patent – claims 1, 2, 3, 6, and 7.

LG’S INFRINGING PRODUCTS

39. LG has been, and now is, directly infringing claims of the Patents-in-Suit under 35 U.S.C. § 271(a) by making, using, offering for sale, selling, and/or importing the below accused smartphones, tablets, and other mobile wireless devices in this District and elsewhere in the United States that include the systems claimed in the Patents-in-Suit and/or by using the methods claimed in the Patents-in-Suit, including, for example, LG’s use of said methods during set-up, testing, and demonstration of its smartphones and tablets.

40. LG has been and now is inducing the direct infringement of method claims of the Patents-in-Suit pursuant to U.S.C. § 271(b) at least by one or more of making, using, offering for sale, selling and/or importing the below accused smartphones, tablets, and other mobile wireless devices in this District and elsewhere in the United States that were designed and intended to use and/or practice the methods and processes covered by the Patents-in-Suit. Further, LG has induced infringement by, for example, providing user guides and other support materials and services to its users and by advertising features that are used, and benefits that are achieved through use of the Patents-in-Suit; as one example, LG’s G3 User Manual encourages users to use Google Apps including Maps that allow the LG customer to “view your current location”, “search for a location”, and “get directions”.

41. Despite LG's awareness of the Patents-in-Suit, LG has continued these acts of inducement with specific intent to cause and encourage direct infringement of the Patents-in-Suit with willful blindness that such activities occurred, are still occurring, and constitute direct infringement of the Patents-in-Suit.

LG'S KNOWLEDGE OF THE PATENTS-IN-SUIT, HOW LG INFRINGES THEM, AND LG'S CONTINUED INFRINGEMENT DESPITE THAT KNOWLEDGE

42. On March 16, 2015, on behalf of AGNC, Global IP Law Group, LLC sent a letter to LG. Federal Express delivered AGNC's letter to Mr. Bon-Joon Koo, LG's Vice Chairman and CEO, on or around March 20, 2015. LG has been aware of several of the Patents-in-Suit no later than that date (including the '648, '758, and '283 patents).

43. In addition to identifying these Patents-in-Suit, AGNC's March 16, 2015 letter identified the LG products and methods that infringe them.

44. With the March 16, 2015 letter, AGNC included claim charts detailing its infringement contentions for the '648, '758, and '283 patents, among others.

45. On June 8, 2015, AGNC (through Global IP Law Group) and LG conducted a telephone call during which they discussed the details of AGNC's infringement contentions with respect to LG's infringing products.

46. In response to LG's requests for additional detail and evidence on the June 8, 2015 telephone call, on June 15, 2015, AGNC (through Global IP Law Group) sent LG follow-up materials providing additional specific evidence and examples of LG's infringement.

47. On September 8, 2015, AGNC (through Global IP Law Group) and LG conducted a second telephone call during which they discussed the details of AGNC's infringement claims in relation to the technical functionality of LG's infringing products.

48. On September 24, 2015, AGNC (through Global IP Law Group) sent LG a claim chart explaining how LG's products infringe AGNC's '227 patent.

49. AGNC and LG signed an NDA effective as of October 26, 2015.

50. On October 27, 2015, AGNC (through Global IP Law Group) explained its infringement contentions for the '648, '758, '283, and '227 patents, among others, to LG at an in-person meeting at LG's facility in Seoul, Korea.

51. During the October 27, 2015 meeting, AGNC (through Global IP Law Group) made a licensing offer to LG, which, if LG had accepted, would have resolved the issues in this litigation.

52. On November 9, 2015, AGNC (through Global IP Law Group) sent LG a letter following up on the October 27, 2015 meeting. AGNC's letter addressed the issues LG raised at the October 27, 2015 meeting and included supplemental claim charts with more details, evidence, and examples of infringement.

53. Between November 9, 2015 and January 28, 2016, on behalf of AGNC, Global IP Law Group sent LG several additional emails and LG did not respond.

54. On January 28, 2016 LG emailed Global IP Law Group and indicated that LG had assigned a new LG contact person for the AGNC matter.

55. On March 3, 2016, AGNC (through Global IP Law Group) sent LG supplemental claim charts for the '648, '758, and '283 patents that included more detail. AGNC also sent LG claim charts for the '555 and '122 patents.

56. On April 5, 2016, AGNC (through Global IP Law Group) sent LG a 23-page letter further explaining LG's infringement and providing LG a list of AGNC's patents.

57. On April 14, 2016 AGNC (through Global IP Law Group) requested that LG participate in a telephone call.

58. On April 18, 2016, AGNC (through Global IP Law Group) emailed LG seeking to discuss any further technical issues on a call.

59. On May 4, 2016, AGNC (through Global IP Law Group) sent LG an email proposing a call to discuss technical issues prior to the in-person meeting that was scheduled for May 26, 2016.

60. On May 8, 2016, AGNC (through Global IP Law Group) sent LG a 17-page letter and proposed to have a call to discuss any remaining technical issues.

61. On May 16, 2016, AGNC (through Global IP Law Group) offered to have a technical call to discuss LG's infringement and requested that LG provide a date on which LG would be available.

62. On May 23, 2016, AGNC (through Global IP Law Group) sent an email to LG further addressing LG's infringement.

63. On May 26, 2016, AGNC (through Global IP Law Group) and LG met in-person a second time at LG's facility in Seoul, Korea.

64. Following up on the May 26 meeting, on June 19, 2016, AGNC (through Global IP Law Group) sent LG further information addressing LG's infringement.

65. AGNC's June 19, 2016 email also included claim charts for the '122, '555, '648, '758, '283, and '227 patents**,** among others.

66. Attempting again to resolve the issue, Global IP Law Group telephoned a Vice President at LG's IP Center, Joosup Kim.

67. On December 12, 2016, AGNC (through Global IP Law Group) sent LG an email inviting LG to a third in-person meeting.

68. LG did not respond to AGNC's December 12, 2016 email.

69. Throughout the almost two years of dealings between AGNC and LG, AGNC has provided LG with at least 10 substantive letters and emails and 25 claim charts explaining its infringement contentions to LG. AGNC has conducted two phone calls and two in-person meetings addressing LG's infringement.

70. LG never raised any prior art issue related to any of the Patents-in-Suit.

71. LG has not agreed to enter into a licensing agreement with AGNC.

72. LG has not provided AGNC any licensing proposal.

73. LG has not provided any counteroffer to AGNC's October 27, 2015 licensing settlement offer.

74. In addition to the prior letters and claim charts, this Complaint serves as additional notice to LG of the Patents-in-Suit and the manner in which they are infringed.

75. Despite knowledge of the Patents-in-Suit and knowledge of the manner in which the Patents-in-Suit are infringed as demonstrated in the provided claim charts, LG has continued to infringe, and induce the infringement of, the Patents-in-Suit.

COUNT I: INFRINGEMENT OF PAT. 6,508,122 CLAIM 1

76. AGNC reasserts and realleges paragraphs 1 through 75 of this Complaint as though set forth fully here.

77. Claim 1 of the ’122 Patent provides:

Preamble to Claim 1	A microelectromechanical system (MEMS) for measuring angular rate of a carrier, comprising:
Element A	an angular rate sensor unit receiving dither driver signals, capacitive pickoff excitation signals and a displacement restoring signal and outputting angle rate signals in response to motion of said carrier and dither motion signals;
Element B	a central circuitry receiving said angle rate signals in response to said motion of said carrier and said dither motion signals and outputting angular rate signals and digital low frequency inertial element displacement signals; and
Element C	a digital signal processing system analyzing said digital low frequency inertial element displacement signals and feeding back said dither driver signals to said angular rate sensor unit.

78. LG makes, uses, sells, offers for sale, and imports wireless mobile devices, including mobile phones, tablets, and smart watches that include a MEMS gyroscope (e.g., InvenSense gyroscope) (“Accused Gyroscope Products”). The Accused Gyroscope Products include, for example, at least the LG G3, G2, G Flex, G Flex 2, G4, G5, Optimus True, V10, V20, Nexus 5X, G Pad II 8.3, G Pad II 10.1, G Pad III 10.1, Urbane Luxe Smart Watch, Watch, Watch R, Watch Urbane, and Watch Urbane 2nd Edition.

79. LG has and continues to make, use, sell, import, and/or offer for sale the Accused Gyroscope Products that meet each and every element of claim 1 of the ’122 Patent.

80. The gyroscopes in the Accused Gyroscope Products are microelectromechanical systems (“MEMS”) for measuring angular rate.

81. The Accused Gyroscope Products contain an InvenSense MPU-6500 IMU or a substantially similar IMU or gyroscope (such as other InvenSense or STMicroelectronics IMUs or gyroscopes).

82. For example, the G3 has an InvenSense MPU-6515 inertial measurement unit.

83. The InvenSense MPU-6515 is a member of the InvenSense MPU-6500 family.

84. The InvenSense MPU-6500 has a three-axis MEMS gyroscope.

85. A gyroscope measures angular rate.

86. The Accused Gyroscope Products' gyroscope contains an angular rate sensor unit (e.g., drive element, proof mass, drive sensor, and Coriolis sensor).

87. The angular rate sensor unit receives driving signals (e.g., dither driver signals).

88. For example, the angular rate sensor unit's drive element receives driving signals (e.g., dither driver signals).

89. The angular rate sensor unit receives capacitive pickoff excitation signals.

90. For example, the angular rate sensor unit's Coriolis sensor senses the movement of the proof mass(es) (e.g., capacitive pickoff excitation signals).

91. The angular rate sensor unit receives a displacement restoring signal.

92. For example, the amplitude, hence displacement, of the angular rate sensor unit's proof mass(es) are controlled by an amplitude control signal (e.g., displacement restoring signal).

93. The gyroscope contains a driving structure that uses driving signals (e.g., dither driver signal) to oscillate a moveable mass(es) (e.g., proof masses, inertial elements).

94. For example, InvenSense gyroscopes have a drive-loop that oscillates (e.g., vibrates) the structure, a sense path that detects the motion caused by Coriolis acceleration, a synchronous demodulator that recovers the rotation signal, and an ADC that provides digital output to a motion processor.

95. InvenSense gyroscopes have amplitude control circuitry to maintain the vibration amplitude.

96. InvenSense gyroscopes' proof mass(es) is/are driven out-of-plane to resonate by torque exerted by parallel-plate electrodes, (e.g., dither driver signals) while also providing amplitude control (e.g., control of the displacement, or amplitude, of the torsion plates) that is used to maintain momentum.

97. The oscillating mass(es), when subjected to rotation, cause/causes a capacitance change.

98. The capacitance change is received by the angular sensor unit (e.g., the angular sensor unit's Coriolis sensor) in the form of a capacitive pickoff excitation signal.

99. For example, in the InvenSense MPU-6500 gyroscope, when rotated, the Coriolis effect causes a vibration that is detected by a capacitive pickoff.

100. The angular rate sensor unit (e.g., the angular sensor unit's drive sensor) receives a displacement restoring signal that indicates the movement of the mass(es) in the drive direction.

101. The capacitance change that is picked up by the angular rate sensor is used to produce angle rate signals in response to the capacitance change that is a result of the motion of the Accused Gyroscope Products.

102. For example, the InvenSense MPU-6500 gyroscope has digital-output X-, Y-, and Z-axis angular rate sensors for outputting the angle rate signals in response to the motion of the carrier.

103. In the InvenSense MPU-6500 gyroscope, the resulting signal is amplified, demodulated, and filtered to produce a voltage that is proportional to the angular rate.

104. Signals produced by, e.g., the drive sensor of the angular rate sensor unit (dither motion signals) are fed into central circuitry.

105. InvenSense gyroscope architecture provides digital output to a motion processor.

106. The Accused Gyroscope Products have central circuitry that receives the angle rate signals from the angular rate sensor unit.

107. The central circuitry outputs angular rate signals (e.g., X-, Y-, and Z-axis angular rate signals).

108. The central circuitry receives the dither motion signals from the angular rate sensor unit.

109. The central circuitry outputs digital low frequency inertial element displacement signals.

110. InvenSense gyroscopes include a drive-loop that consists of a capacitive position sensing stage followed by a phase detector, or oscillator, to oscillate the MEMS structure at resonance.

111. A drive sense amplifier (Op Amp in parallel with a capacitor, or electronic current integrator, that inherently acts as a low pass filter) processes the dither motion signals into low frequency inertial element displacement signals.

112. The low frequency inertial element displacement signals feed into a comparator, or similar component, and result in digital low frequency inertial element displacement signals.

113. The InvenSense gyroscope architecture also includes amplitude control circuitry that effectively controls the displacement of the inertial elements.

114. InvenSense gyroscopes contain circuitry that recovers, e.g., receives, the angle rate signals that are in response to motion of the Accused Gyroscope Products and receives the vibration at resonance due to the drive loop (e.g., dither motion signals).

115. InvenSense gyroscopes receive the angular rate signals via a sense path with a synchronous demodulator.

116. The Accused Gyroscope Products have a digital processing system that analyzes the digital low frequency inertial element displacement signals.

117. The digital processing system feeds the dither driver signals to the angular rate sensor unit.

118. The digital low frequency inertial element displacement signals feed into a control loop that controls the oscillation of the inertial elements/proof masses.

119. For example, the InvenSense gyroscope's drive loop includes a phase detector (or an oscillator (e.g., phase lock loop, etc.)) that outputs an in-phase signal (which is in phase with the drive signal) to a drive mixer for mixing with the output of an AGC circuit to generate a drive signal.

120. The drive signal is then amplified by a drive amplifier and provided to the drive element that generates the force to vibrate the proof mass(es).

121. InvenSense gyroscopes utilize a phase detector, or oscillator, such as a Phase-Lock Loop ("PLL") in the digital processing system to control the phase and an Automatic Gain Control ("AGC"), or similar component, to control the amplitude.

122. Direct infringement of claim 1 occurs when LG makes, imports, uses, sells and offers for sale the Accused Gyroscope Products that meet claim 1 of the '122 Patent.

123. LG has knowledge of the '122 Patent and AGNC's allegations of how the Accused Gyroscope Products infringe claim 1 of the '122 Patent since at least March 3, 2016.

124. LG makes, uses, offers to sell, sells, and/or imports the Accused Gyroscope Products knowing that the Accused Gyroscope Products infringe claim 1 of the '122 Patent.

COUNT II: INFRINGEMENT OF PAT. 6,311,555 CLAIM 49

125. AGNC reasserts and realleges paragraphs 1 through 75 of this Complaint as though set forth fully here.

126. Claim 49 of the '555 Patent provides:

Preamble to Claim 49	An angular rate producing process for measuring a vehicle angular rate, comprising the steps of:
Element A	(a) receiving dither drive signal to maintain an oscillation of at least one set of inertial elements in an angular rate detecting unit with constant momentum, and producing angular motion-induced signals with respect to said vehicle angular rate and inertial element dither motion signals;
Element B	(b) converting said angular motion-induced signals from said angular rate detecting unit in an interfacing circuitry into consistent and repeatable angular rate signals that are proportional to said vehicle angular rate, and converting said inertial element dither motion signals from said angular rate detecting unit in said interfacing circuitry into digital element displacement signals with predetermined phase; and
Element C	(c) inputting said digital element displacement signals into a digital processing system and producing said dither drive signal for locking high-quality factor frequency and amplitude of said oscillating inertial elements in said angular rate detecting unit.

127. LG makes, uses, sells, offers for sale, and imports wireless mobile devices, including mobile phones, tablets, and smart watches that include a MEMS gyroscope (e.g., InvenSense gyroscope) ("Accused Gyroscope Products"). The Accused Gyroscope Products include, for example, at least the LG G3, G2, G Flex, G Flex 2, G4, G5, Optimus True, V10, V20, Nexus 5X, G Pad II 8.3, G Pad II 10.1, G Pad III 10.1, Urbane Luxe Smart Watch, Watch, Watch R, Watch Urbane, and Watch Urbane 2nd Edition.

128. LG has and continues to make, use, sell, import, and/or offer for sale Accused Gyroscope Products, the use of which meets each and every element of claim 49 of the '555 Patent.

129. The Accused Gyroscope Products perform an angular rate producing process for measuring an angular rate.

130. The Accused Gyroscope Products contain an InvenSense MPU-6500 inertial measurement unit or a substantially similar IMU or gyroscope (such as other InvenSense or STMicroelectronics IMUs or gyroscopes).

131. For example, the G3 contains an InvenSense MPU-6515 inertial measurement unit.

132. The InvenSense MPU-6515 is a member of the InvenSense MPU-6500 family.

133. The InvenSense MPU-6500 has a three-axis MEMS gyroscope.

134. A gyroscope measures angular rate.

135. The InvenSense MPU-6500 has an angular rate detecting unit (e.g., drive element, proof mass, drive sensor, and Coriolis sensor).

136. The Accused Gyroscope Products contain a driving structure that uses a driving signal (e.g., dither drive signal) to oscillate a set of moveable masses (e.g., proof masses, inertial elements).

137. InvenSense gyroscopes have a drive-loop that oscillates (e.g., vibrates) the driving structure (e.g., vibration at resonance), a sense path that detects the motion caused by Coriolis acceleration, a synchronous demodulator that recovers the rotation signal, and an ADC that provides digital output to a motion processor.

138. InvenSense gyroscopes have amplitude control circuitry to maintain constant momentum (e.g., constant vibration amplitude) (e.g., a set of moveable masses are in oscillation with constant momentum).

139. InvenSense gyroscopes' proof masses are driven out-of-plane to resonate by torque exerted by parallel-plate electrodes (e.g., dither drive signals) while also providing amplitude control (e.g., control of the displacement, or amplitude, of the torsion plates) that are used to constantly drive the momentum.

140. In the InvenSense gyroscope architecture, a flexibly connected drive system and sense system creates two resonant modes and a drive resonant frequency.

141. The InvenSense gyroscope has drive signals that drive the proof masses/inertial elements at a resonant frequency to maintain constant momentum.

142. The movement of the proof masses due to rotation causes a capacitance change that is picked up by the sensing structure (e.g., Coriolis sensor) that produces a voltage signal in response.

143. The voltage signal is proportional to the applied angular rate, e.g., the voltage signal produced is an angular motion-induced signal with respect to the vehicle angular rate of the Accused Gyroscope Products.

144. For example, the InvenSense MPU-6500 gyroscope has digital-output X-, Y-, and Z-axis angular rate sensors for outputting the angular motion-induced signals (e.g., the voltage signal produced).

145. In the InvenSense MPU-6500 gyroscope, the voltage signal produced is amplified, demodulated, and filtered to produce a voltage signal that is proportional to the angular rate.

146. Signals produced by, e.g., the drive sensor of the gyroscope (inertial element dither motion signals) are fed into interfacing circuitry.

147. The Accused Gyroscope Products' gyroscope converts the angular motion-induced signals from the angular detecting unit in an interfacing circuitry into consistent and repeatable angular rate signals (e.g., X-, Y-, and Z-axis angular rate signals).

148. The consistent and repeatable angular rate signals are proportional to the vehicle angular rate.

149. For example, the InvenSense gyroscope architecture includes a sense path that detects the motion caused by Coriolis acceleration, a synchronous demodulator that recovers the rotation signal, and an ADC that provides digital output to a motion processor.

150. The Accused Gyroscope Products' gyroscope converts the inertial element dither motion signals from the angular rate detecting unit in interfacing circuitry into digital element displacement signals.

151. The digital element displacement signals have a predetermined phase.

152. For example, in the InvenSense gyroscope architecture, the drive-loop consists of a capacitive position sensing stage followed by a phase detector, or oscillator, to oscillate the MEMS structure at resonance.

153. The InvenSense gyroscope architecture also includes amplitude control circuitry that effectively controls the displacement of the inertial elements.

154. The Accused Gyroscope Products' gyroscope inputs the digital element displacement signals into a digital processing system and produces the dither drive signal.

155. The dither drive signal locks the high-quality factor frequency of the oscillating inertial elements in the angular rate detecting unit.

156. The dither drive signal locks the amplitude of the oscillating inertial elements in the angular rate detecting unit.

157. The digital element displacement signals are input to a phase locked loop to lock a high-quality factor frequency.

158. The phase locked loop elements feed into a controller that controls the oscillation of the inertial elements.

159. For example, the InvenSense gyroscope's drive loop includes a phase detector (or an oscillator (e.g., phase lock loop, etc.)) that outputs an in-phase signal (which is in phase with the drive signal) to a drive mixer for mixing with the output of an AGC circuit to generate a drive signal.

160. The drive signal is then amplified by a drive amplifier and provided to the drive element that generates the force to vibrate the proof mass.

161. InvenSense gyroscopes utilize a phase detector or oscillator such as a Phase-Lock Loop ("PLL") in the digital processing system to control the phase and an Automatic Gain Control ("AGC"), or similar component, to control the amplitude.

162. Direct infringement of claim 49 of the '555 Patent occurs whenever the Accused Gyroscope Products' gyroscope is active while the Accused Gyroscope Products are used in/on a vehicle.

163. LG infringes claim 49 of the '555 Patent by making and selling the Accused Gyroscope Products designed to practice the claimed process.

164. In addition, LG infringes claim 49 of the '555 Patent by using the Accused Gyroscope Products directly, including in relation to product testing.

165. In the alternative, LG induces infringement of claim 49 of the '555 Patent by end users including by distributing the Accused Gyroscope Products that practice the claimed process in ordinary use.

166. The Accused Gyroscope Products' gyroscope is active, at least some of the time, whenever LG or its customers operate the Accused Gyroscope Products.

167. LG has knowledge of the ’555 Patent and AGNC’s allegations of how the Accused Gyroscope Products infringe claim 49 of the ’555 Patent since at least March 3, 2016.

168. LG makes, uses, offers to sell, sells, and/or imports the Accused Gyroscope Products knowing that LG has infringed and continues to infringe at least claim 49 of the ’555 Patent, when the Accused Gyroscope Products’ gyroscope was or is active, under 35 U.S.C. § 271(a) directly.

169. LG makes, uses, offers to sell, sells, and/or imports the Accused Gyroscope Products knowing that LG’s customers and/or end users have directly infringed and are directly infringing each and every claim limitation of at least claim 49 of the ’555 Patent, including when the Accused Gyroscope Products’ gyroscope was or is active. LG actively induces customers and end-users to directly infringe each and every claim limitation of at least claim 49 of the ’555 Patent under 35 U.S.C. § 271(b).

170. LG has had actual knowledge of the ’555 Patent since at least March 3, 2016.

171. LG has been and is knowingly inducing its customers and/or end users to directly infringe at least claim 49 of the ’555 Patent with the specific intent to encourage such infringement, and knowing that the acts induced constitute patent infringement. LG’s inducement includes, for example, encouraging customers to turn on and use the Accused Gyroscope Products by providing technical guides, product data sheets, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce its customers and/or end users to directly infringe at least claim 49 of the ’555 Patent by using the Accused Gyroscope Products’ gyroscope.

COUNT III: INFRINGEMENT OF PAT. 6,671,648 CLAIM 1

172. AGNC reasserts and realleges paragraphs 1 through 75 of this Complaint as though set forth fully here.

173. Claim 1 of the ’648 Patent provides:

Preamble of Claim 1	A micro inertial measurement unit, comprising:
Element A	an angular rate producer comprising a X axis angular rate detecting unit which produces a X axis angular rate electrical signal, a Y axis angular rate detecting unit which produces a Y axis angular rate electrical signal, and a Z axis angular rate detecting unit which produces a Z axis angular rate electrical signal;
Element B	an acceleration producer comprising a X axis accelerometer which produces a X axis acceleration electrical signal, a Y axis accelerometer which produces a Y axis acceleration electrical signal, and a Z axis accelerometer which produces a Z axis acceleration electrical signal; and
Element C	an angular increment and velocity increment producer, which is electrically connected with said X axis, Y axis and Z axis angular rate detecting units and said X axis, Y axis and Z axis accelerometers, receiving said X axis, Y axis and Z axis angular rate electrical signals and said X axis, Y axis and Z axis acceleration electrical signals from said angular rate producer and said acceleration producer respectively, wherein said X axis, Y axis and Z axis angular rate electrical signals and said X axis, Y axis and Z axis acceleration electrical signals are converted into are digital angular increments and digital velocity increments respectively.

174. LG makes, uses, sells, offers for sale and imports wireless mobile devices, including mobile phones, tablets, and smart watches that include an IMU (“Accused IMU Products”). The Accused IMU Products include, at least the LG G3, G2, G Flex, G Flex 2, G4, G5, Optimus True, V10, V20, Nexus 5X, G Pad II 8.3, G Pad II 10.1, G Pad III 10.1, Urbane Luxe Smart Watch, Watch, Watch R, Watch Urbane, and Watch Urbane 2nd Edition.

175. LG has and continues to manufacture, use, sell, import, and/or offer for sale Accused IMU Products that meet and/or are used to meet each and every element of claim 1 of the ’648 Patent.

176. The Accused IMU Products contain a micro-electro-mechanical (“MEMS”) gyroscope.

177. The Accused IMU Products contain a MEMS accelerometer.

178. The Accused IMU Products contain a micro IMU comprised of a gyroscope and accelerometer.

179. For example, the G3 comprises an InvenSense MPU-6515.

180. The InvenSense MPU-6515 is a member of the InvenSense MPU-6500 family.

181. The InvenSense MPU-6500 includes a triple-axis MEMS gyroscope.

182. The InvenSense MPU-6500 includes a triple-axis MEMS accelerometer.

183. The Accused IMU Products’ gyroscope senses angular rotation about three axes.

184. The Accused IMU Products’ gyroscope is an angular rate producer that produces angular rate signals for three axes.

185. The Accused IMU Products’ accelerometer senses acceleration about three axes.

186. The Accused IMU Products’ accelerometer is an acceleration producer that produces acceleration signals for three axes.

187. The Accused IMU Products have an angular increment and velocity increment producer that is electrically connected with the gyroscope and accelerometer.

188. The angular increment and velocity increment producer receives the angular rate and acceleration electrical signals.

189. The angular increment and velocity increment producer converts the angular rate electrical signals into digital angular increments.

190. The angular increment and velocity increment producer converts acceleration electrical signals into digital velocity increments.

191. For example, the InvenSense MPU-6500 has an embedded Digital Motion Processor (DMP) that offloads computation of motion processing algorithms from the host processor.

192. The DMP acquires data from accelerometers and gyroscopes and processes the data.

193. Velocity is obtained by a single integration of the accelerometer signal.

194. Relative angle is obtained by a single integration of the gyroscope signal.

195. The Accused IMU Products have an Android operating system.

196. An Android operating system is pre-loaded on each Accused IMU Product before the product reaches the end-user.

197. Android devices integrate the output of the gyroscope (i.e., convert the angular rate signal) to calculate a rotation describing the change of angles over time (i.e., angular increment or delta rotation).

198. In Android, the accelerometer provides velocity (e.g., how fast your car is going) after integration.

199. The Accused IMU Products' inertial measurement unit utilizes sensor fusion algorithms.

200. InvenSense's sensor fusion algorithms integrate the gyroscope signal to obtain angle rather than angular rate.

201. The determination of angle from the angular rate necessarily requires the conversion to an angular increment.

202. Angular increments are obtained during the process by which angle is obtained from angular rate.

203. InvenSense's sensor fusion algorithms integrate the accelerometer signal to obtain velocity.

204. The determination of velocity from the acceleration necessarily requires the conversion to a velocity increment.

205. Velocity increments are obtained during the process by which velocity is obtained from acceleration.

206. Direct infringement of claim 1 of the '648 Patent occurs when LG makes, uses, offers to sell, sells or imports the Accused IMU Products.

207. LG has knowledge of the '648 Patent and AGNC's allegations of how the Accused IMU Products infringe claim 1 of the '648 Patent since at least March 16, 2015.

COUNT IV: INFRINGEMENT OF PAT. 6,671,648 CLAIM 4

208. AGNC reasserts and realleges paragraphs 1 through 75, and paragraphs 172 through 207 of this Complaint as though set forth fully here.

209. Claim 4 of the '648 Patent provides:

Claim 4	A micro inertial measurement unit, as recited in claim 1, wherein said X axis, Y axis and Z axis angular rate electrical signals produced from said angular producer are analog angular rate voltage signals directly proportional to angular rates of a carrier carrying said micro inertial measurement unit, and said X axis, Y axis and Z axis acceleration electrical signals produced from said acceleration producer are analog acceleration voltage signals directly proportional to accelerations of said vehicle.

210. The Accused IMU Products meet and/or are used to meet each of the limitations of claim 4 of the ’648 Patent.

211. The Accused IMU Products’ gyroscope has an angular producer.

212. The angular producer produces analog angular rate voltage signals.

213. The angular rate voltage signals are directly proportional to the angular rate of the Accused IMU Products.

214. For example, the G3’s InvenSense MPU-6515’s, a member of the InvenSense MPU-6500 family, gyroscope produces analog angular rate signals that are digitized in an Analog-to-Digital converter (ADC).

215. The resulting signals are proportional to the angular rate along a particular axis.

216. The Accused IMU Products’ accelerometer has an acceleration producer.

217. The acceleration producer produces analog acceleration voltage signals.

218. The acceleration voltage signals are directly proportional to the acceleration of the Accused IMU Products.

219. For example, the InvenSense MPU-6500’s accelerometer produces acceleration signals that are digitized in an Analog-to-Digital converter (“ADC”).

220. The resulting signals are proportional to the acceleration along a particular axis.

221. Direct infringement of claim 4 of the ’648 Patent occurs when LG makes, uses, offers to sell, sells, or imports the Accused IMU Products.

222. LG has knowledge of the ’648 Patent and AGNC’s allegations of how the Accused IMU Products infringe claim 4 of the ’648 Patent since at least March 16, 2015.

COUNT V: INFRINGEMENT OF PAT. 6,697,758 CLAIM 1

223. AGNC reasserts and realleges paragraphs 1 through 75 of this Complaint as though set forth fully here.

224. Claim 1 of the ’758 Patent provides:

Preamble of Claim 1	A processing method for motion measurement, comprising the steps of:
Element A	(a) producing three-axis angular rate signals by an angular rate producer and three-axis acceleration signals by an acceleration producer;
Element B	(b) converting said three-axis angular rate signals into digital angular increments and converting said three-axis acceleration signals into digital velocity increments in an angular increment and velocity increment producer; and
Element C	(c) computing attitude and heading angle measurements using said three-axis digital angular increments and said three-axis velocity increments in an attitude and heading processor.

225. LG makes, uses, sells, offers for sale and imports wireless mobile devices, including mobile phones, tablets, and smart watches that include an IMU (“Accused IMU Products”). The Accused IMU Products include, at least the LG G3, G2, G Flex, G Flex 2, G4, G5, Optimus True, V10, V20, Nexus 5X, G Pad II 8.3, G Pad II 10.1, G Pad III 10.1, Urbane Luxe Smart Watch, Watch, Watch R, Watch Urbane, and Watch Urbane 2nd Edition.

226. LG has and continues to manufacture, use, sell, import, and/or offer for sale Accused IMU Products that are used to meet each and every element of claim 1 of the ’758 Patent.

227. The Accused IMU Products contain a gyroscope.

228. The Accused IMU Products contain an accelerometer.

229. The Accused IMU Products contain an IMU that comprises a gyroscope and accelerometer.

230. For example, the G3 comprises an InvenSense MPU-6515.

231. The InvenSense MPU-6515 is a member of the InvenSense MPU-6500 family.

232. The InvenSense MPU-6500 includes a triple-axis MEMS gyroscope.

233. The InvenSense MPU-6500 includes a triple-axis MEMS accelerometer.

234. The Accused IMU Products' gyroscope senses angular rotation about three axes.

235. The Accused IMU Products' gyroscope is an angular rate producer that produces angular rate signals for three axes.

236. The Accused IMU Products' accelerometer senses acceleration about three axes.

237. The Accused IMU Products' accelerometer is an acceleration producer that produces acceleration signals for three axes.

238. The Accused IMU Products have an angular increment and velocity increment producer.

239. The angular increment and velocity increment producer receives the angular rate and acceleration signals.

240. The angular increment and velocity increment producer converts the angular rate signals into digital angular increments.

241. The angular increment and velocity increment producer converts acceleration signals into digital velocity increments.

242. For example, the InvenSense MPU-6500 has an embedded Digital Motion Processor ("DMP") that offloads computation of motion processing algorithms from the host processor.

243. The DMP acquires data from accelerometers and gyroscopes and processes the data.

244. Velocity is obtained by a single integration of the accelerometer signal.

245. Relative angle is obtained by a single integration of the gyroscope signal.

246. The Accused IMU Products have an Android operating system.

247. An Android operating system is pre-loaded on each Accused IMU Product before the product reaches the end-user.

248. Android devices integrate the output of the gyroscope (i.e., convert the angular rate signal) to calculate a rotation describing the change of angles over time (i.e., angular increment or delta rotation).

249. In Android, the accelerometer provides velocity (e.g., how fast your car is going) after integration.

250. The Accused IMU Products' inertial measurement unit utilizes sensor fusion algorithms.

251. InvenSense's sensor fusion algorithms integrate the gyroscope signal to obtain angle rather than angular rate.

252. The determination of angle from the angular rate necessarily requires the conversion to an angular increment.

253. Angular increments are obtained during the process by which angle is obtained from angular rate.

254. InvenSense's sensor fusion algorithms integrate the accelerometer signal to obtain velocity.

255. The determination of velocity from the acceleration necessarily requires the conversion to a velocity increment.

256. Velocity increments are obtained during the process by which velocity is obtained from acceleration.

257. The Accused IMU Products contain an attitude and heading processor.

258. For example, the G3 has a Qualcomm Snapdragon 801 processor.

259. The Qualcomm Snapdragon 801 processor includes IZat location technology.

260. The Qualcomm Snapdragon 801 processor with IZat location technology can always point you in the right direction.

261. The Qualcomm Snapdragon 801 processor with IZat location technology knows exactly where you are and where you need to go.

262. For example, the InvenSense MPU-6500's DMP offloads computation of motion processing algorithms from the host processor and acquires data from accelerometers and gyroscopes and processes the data.

263. InvenSense sensor fusion algorithms provide, for example, Quaternion, Orientation, Motion, and Gestures.

264. The Accused IMU Products' sensor fusion algorithm (using data from the sensors such as the gyroscope) computes attitude (that is, orientation using e.g., rotation matrix or quaternion representation).

265. The Accused IMU Products' sensor fusion algorithm (using data from the sensors such as the gyroscope and magnetometer) computes heading.

266. Direct infringement of claim 1 of the '758 Patent occurs when LG and end users use Accused IMU Products in a manner such that they practice the claimed method.

267. LG infringes claim 1 of the '758 Patent by making and selling the Accused IMU Products designed to practice the claimed process.

268. In addition, LG infringes claim 1 of the '758 Patent by using the Accused IMU Products directly, including in relation to product testing.

269. In the alternative, LG induces infringement of claim 1 of the '758 Patent by end users including by distributing the Accused IMU Products that practice the claimed process in ordinary use.

270. LG has knowledge of the '758 Patent and AGNC's allegations of how the Accused IMU Products infringe claim 1 of the '758 Patent since at least March 16, 2015.

271. LG actively induces end users' infringement of claim 1 of the '758 Patent at least by one of more of supplying, offering for sale, and selling the Accused IMU Products that were designed and intended to practice the method in claim 1 of the '758 Patent**.**

272. LG makes, uses, offers to sell, sells, and/or imports the Accused IMU Products knowing that LG has infringed and continues to infringe at least claim 1 of the

'758 Patent, when the Accused IMU Products' IMU was or is active, under 35 U.S.C. § 271(a) directly.

273. LG makes, uses, offers to sell, sells, and/or imports the Accused IMU Products knowing that LG's customers and/or end users have directly infringed and are directly infringing each and every claim limitation of at least claim 1 of the '758 Patent, including when the Accused IMU Products' IMU was or is active. LG actively induces customers and end-users to directly infringe each and every claim limitation of at least claim 1 of the '758 Patent under 35 U.S.C. § 271(b).

274. LG has had actual knowledge of the '758 Patent since at least March 16, 2015.

275. LG has been and is knowingly inducing its customers and/or end users to directly infringe at least claim 1 of the '758 Patent with the specific intent to encourage such infringement, and knowing that the acts induced constitute patent infringement. LG's inducement includes, for example, encouraging customers to turn on and use the Accused IMU Products by providing technical guides, product data sheets, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce its customers and/or end users to directly infringe at least claim 1 of the '758 Patent by using the Accused IMU Products' IMU.

COUNT VI: INFRINGEMENT OF PAT. 6,516,283 CLAIM 1

276. AGNC reasserts and realleges paragraphs 1 through 75 of this Complaint as though set forth fully here.

277. Claim 1 of the '283 Patent provides:

Preamble of Claim 1	A core inertial measurement unit, comprising:
Element A	an angular rate producer producing X axis, Y axis and Z axis angular rate electrical signals;
Element B	an acceleration producer producing X axis, Y axis and Z axis acceleration electrical signals;
Element C	an angular increment and velocity increment producer converting said X axis, Y axis and Z axis angular rate electrical signals into three-axis digital angular increments and converting said X axis, Y axis and Z axis acceleration electrical signals into three-axis digital velocity increments;
Element D	an Earth's magnetic field detector producing Earth's magnetic field vector measurements;
Element E	and a position, attitude and heading processor connected with said angular rate producer, said acceleration producer and said Earth's magnetic field detector, so as to use said three-axis digital angular increments, said three-axis digital velocity increments and said position, attitude and heading angle measurements to compute motion measurements including position, attitude and heading angle measurements.

278. LG makes, uses, sells, offers for sale and imports wireless mobile devices, including mobile phones, tablets, and smart watches that include an IMU and a compass ("Accused IMU/Compass Products"). The Accused IMU/Compass Products include, for example, at least the LG G3, G2, G Flex, G Flex 2, G4, G5, Optimus True, V10, V20, Nexus 5X, G Pad II 8.3, Urbane Luxe Smart Watch, Watch, Watch R, Watch Urbane, and Watch Urbane 2nd Edition.

279. LG has and continues to manufacture, use, sell, import, and/or offer for sale Accused IMU/Compass Products that meet each and every element of claim 1 of the '283 Patent.

280. The Accused IMU/Compass Products contain a gyroscope.

281. The Accused IMU/Compass Products contain an accelerometer.

282. The Accused IMU/Compass Products contain an IMU comprised of a gyroscope and accelerometer.

283. For example, the G3 comprises an InvenSense MPU-6515.

284. The InvenSense MPU-6515 is a member of the InvenSense MPU-6500 family.

285. The InvenSense MPU-6500 includes a triple-axis MEMS gyroscope.

286. The InvenSense MPU-6500 includes a triple-axis MEMS accelerometer.

287. The Accused IMU/Compass Products' gyroscope senses angular rotation about three axes.

288. The Accused IMU/Compass Products' gyroscope is an angular rate producer that produces angular rate electrical signals for three axes.

289. The Accused IMU/Compass Products' accelerometer senses acceleration about three axes.

290. The Accused IMU/Compass Products' accelerometer is an acceleration producer that produces acceleration electrical signals for three axes.

291. The Accused IMU/Compass Products have an angular increment and velocity increment producer.

292. The angular increment and velocity increment producer receives the angular rate and acceleration electrical signals.

293. The angular increment and velocity increment producer converts the angular rate electrical signals into digital angular increments.

294. The angular increment and velocity increment producer converts acceleration electrical signals into digital velocity increments.

295. For example, the InvenSense MPU-6500 has an embedded Digital Motion Processor ("DMP") that offloads computation of motion processing algorithms from the host processor.

296. The DMP acquires data from accelerometers and gyroscopes and processes the data.

297. Velocity is obtained by a single integration of the accelerometer signal.

298. Relative angle is obtained by a single integration of the gyroscope signal.

299. The Accused IMU/Compass Products have an Android operating system.

300. The Android operating system is pre-loaded on each Accused IMU/Compass Product before the product reaches the end-user.

301. Android devices integrate the output of the gyroscope (i.e., convert the angular rate signal) to calculate a rotation describing the change of angles over time (i.e., angular increment or delta rotation).

302. In the Android operating system, the accelerometer provides velocity (e.g., how fast your car is going) after integration.

303. The Accused IMU/Compass Product uses sensor fusion algorithms.

304. InvenSense's sensor fusion algorithms integrate the gyroscope signal to obtain angle rather than angular rate.

305. The angle is used to determine angular increments.

306. The determination of angle from the angular rate necessarily requires the conversion to an angular increment.

307. Angular increments are obtained during the process by which angle is obtained from angular rate.

308. InvenSense's sensor fusion algorithms integrate the accelerometer signal to obtain velocity.

309. The determination of velocity from the acceleration necessarily requires the conversion to a velocity increment.

310. Velocity increments are obtained during the process by which velocity is obtained from acceleration.

311. The Accused IMU/Compass Products contain a compass (Earth's magnetic field detector).

312. The compass produces Earth's magnetic field vector measurements.

313. For example, the G3 has an Alps Electric Korea Co., LTD. HSCDTD008A 3 Axis Geomagnetic Sensor.

314. The Alps Electric Korea Co., LTD. HSCDTD008A 3 Axis Geomagnetic Sensor produces Earth's magnetic field vector measurements.

315. The Accused IMU/Compass Products contain a position, attitude and heading processor that is connected with the angular rate producer, the acceleration producer, and the Earth's magnetic field detector (compass).

316. For example, the G3 has a Qualcomm Snapdragon 801 processor.

317. The Qualcomm Snapdragon 801 processor includes IZat location technology.

318. The Qualcomm Snapdragon 801 processor with IZat location technology can always point you in the right direction and knows exactly where you are and where you need to go.

319. For example, the InvenSense MPU-6500's DMP offloads computation of motion processing algorithms from the host processor and acquires data from accelerometers and gyroscopes and processes the data.

320. InvenSense sensor fusion algorithms provide, for example, Quaternions, Orientation, Motion, and Gestures.

321. The Accused IMU/Compass Products' sensor fusion algorithm (using data from the sensors such as the gyroscope) computes attitude (that is, orientation using e.g., rotation matrix or quaternion representation).

322. The Accused IMU/Compass Products' sensor fusion algorithm (using data from the sensors such as the gyroscope and compass) computes heading.

323. The position, attitude and heading processor uses sensor fusion algorithms to provide, e.g., orientation, quaternions, pitch, roll, yaw, and heading measurements (motion measurements).

324. The sensor fusion algorithms use the digital angular increments, the digital velocity increments, and position, attitude and heading angle measurements to compute motion measurements.

325. The motion measurements include position, attitude and heading angle measurements.

326. Direct infringement of claim 1 of the '283 Patent occurs when LG makes, uses, offers to sell, sells and imports the Accused IMU/Compass Products.

327. LG has knowledge of the '283 Patent and AGNC's allegations of how the Accused IMU/Compass Products infringe claim 1 of the '283 Patent since at least March 16, 2015.

COUNT VII: INFRINGEMENT OF PAT. 6,516,283 CLAIM 3

328. AGNC reasserts and realleges paragraphs 1 through 75 and paragraphs 276 through 327 of this Complaint as though set forth fully here.

329. Claim 3 of the ’283 Patent provides:

Claim 3	A core inertial measurement unit, as recited in claim 1, further comprising a LCD display module, which is connected with said position, attitude and heading processor, providing a display of said motion measurements of said core inertial measurement unit in terms of position, velocity, and attitude data.

330. The Accused IMU/Compass Products meet each of the limitations of claim 3 of the ’283 Patent.

331. The Accused IMU/Compass Products contain a LCD display module.

332. For example, the G3 has a 5.5-inch LCD capacitive touchscreen display.

333. The display module is connected to the position, attitude and heading processor.

334. The display module provides a display of the motion measurements (position, velocity, and attitude data).

335. The Accused IMU/Compass Products have an Android operating system.

336. Google Maps is pre-loaded on each Accused IMU/Compass Product before the product reaches the end-user.

337. Google Maps’ current location blue dot is powered by the Fused Location Provider (FLP) that combines motion measurements from an inertial measurement unit with other sources such as, e.g., GPS, Wi-Fi, and cellular.

338. For example, when running Google Maps, the Accused IMU/Compass Products display motion measurements (position, velocity, and attitude data).

339. Direct infringement of claim 3 of the ’283 Patent occurs when LG makes, uses, offers to sell, sells and imports the Accused IMU/Compass Products.

340. LG has knowledge of the ’283 Patent and AGNC’s allegations of how the Accused IMU/Compass Products infringe claim 3 of the ’283 Patent since at least the date of this Complaint.

COUNT VIII: INFRINGEMENT OF PAT. 6,792,353 CLAIM 1

341. AGNC reasserts and realleges paragraphs 1 through 75 of this Complaint as though set forth fully here.

342. Claim 1 of the ’353 Patent provides:

Preamble of Claim 1	An enhanced inertial measurement unit/global positioning system and map navigation process, comprising steps of:
Element A	(a) receiving a measured position from an integrated inertial measurement unit/global positioning system device, wherein said integrated inertial measurement unit/global positioning system device comprises a micro IMU, a GPS receiver and means for blending measurements from said micro IMU and said GPS receiver;
Element B	(b) retrieving geospatial data from a geospatial map database based on said measured position from said integrated inertial measurement unit/global positioning system device by using a tile index file, wherein said tile index file stores geographic extent information of tiles which are geographically subdividing a coverage solely for a purpose of enhancing data management; wherein a geographic extent of an access area is compared with said geographic extent of said tiles to derive a plurality of involved tiles for said access area;
Element C	(c) performing time-space filtering based on said measured position and said retrieved geospatial data from said geospatial map database to derive a displaying position for a user; wherein said measured position and a previous position and a previous velocity are used to derive a true position for said user; and
Element D	(d) displaying a trajectory of said user on a graphic displaying unit, which tracks a motion of said user.

343. LG makes, uses, sells, offers for sale and imports wireless mobile devices, including mobile phones and tablets that include an IMU, a GPS transceiver, and an Android operating system ("Accused IMU/GPS Products"). The Accused IMU/GPS Products include, at least the LG G3, G2, G Flex, G Flex 2, G4, G5, Optimus True, V10, V20, Nexus 5X, G Pad II 8.3, G Pad II 10.1, and G Pad III 10.1.

344. LG has and continues to manufacture, use, sell, import, and/or offer for sale Accused IMU/GPS Products that are used to meet each and every element of claim 1 of the '353 Patent.

345. The Accused IMU/GPS Products are global positioning systems that perform a map navigation process with a mapping application.

346. The Accused IMU/GPS Products have an Android operating system.

347. An Android operating system is pre-loaded on each Accused IMU/GPS Product before the product reaches the end-user.

348. Accused IMU/GPS Products contain Google Maps.

349. Google Maps is pre-loaded on each Accused IMU/GPS Products before the product reaches the end-user.

350. The Accused IMU/GPS Products contain a micro electro-mechanical ("MEMS") gyroscope.

351. The Accused IMU/GPS Products contain a MEMS accelerometer.

352. The Accused IMU/GPS Products contain a micro inertial measurement unit that comprises a MEMS gyroscope and MEMS accelerometer.

353. The Accused IMU/GPS Products contain a GPS transceiver.

354. The Accused IMU/GPS Products contain a display.

355. The Accused IMU/GPS Products receive a measured position from an integrated inertial measurement unit/global positioning system device (e.g., IMU and GPS).

356. The Accused IMU/GPS Products include a Qualcomm Snapdragon processor.

357. For example, the G3 has a Qualcomm Snapdragon 801 processor.

358. The Qualcomm Snapdragon processor has Qualcomm IZat location technology that provides ubiquitous location information indoors, outdoors, and urban canyons.

359. The Qualcomm Snapdragon processor has Qualcomm IZat location technology that offers uninterrupted coverage.

360. The Accused IMU/GPS Products contain an IMU that is used for sensing motion measurements and produces positioning data.

361. The Accused IMU/GPS Products' Qualcomm Snapdragon processor's IZat location engine processes measurements from inertial sensors including accelerometers and gyroscopes.

362. The Accused IMU/GPS Products' GPS receiver provides positioning data.

363. Qualcomm's IZat contained in the Accused IMU/GPS Products uses positioning data from the IMU and positioning data from the GPS receiver to provide a measured position.

364. Google Maps is powered by the Fused Location Provider ("FLP") that combines GPS, Wi-Fi, cell, accelerometer, gyroscope, and magnetometer data and manages battery consumption.

365. The Google Maps FLP incorporates sensor fusion algorithms that combine accelerometer, gyroscope, magnetometer, and barometer with raw GPS pseudoranges.

366. The Accused IMU/GPS Products blend measurements from the IMU and GPS.

367. The Accused IMU/GPS Products use a mapping application (e.g., Google Maps) to retrieve geospatial data from a geospatial map database.

368. The geospatial data is retrieved based on the measured positions from the integrated IMU/GPS system.

369. The geospatial data is retrieved by using a tile index file.

370. The tile index file stores geographic extent information of tiles.

371. The tiles geographically subdivide a coverage for enhancing data management.

372. The Google Maps API determines which tiles are needed and translates that information into a set of tiles to retrieve.

373. The geographic extent of an access area (e.g., the access area that is encompassed within the display screen of an Accused IMU/GPS Products) is compared (e.g., using zoom level, map tile location in the grid, etc.) with the geographic extent of the tiles to determine a plurality of involved tiles for the access area.

374. The Accused IMU/GPS Products use the integrated IMU/GPS system and a mapping application (e.g., Google Maps) to perform time-space-filtering based on the measured position of a device and the retrieved geospatial data from a geospatial map database.

375. The time-space filtering derives a position to be displayed for a user.

376. Google Maps uses several sources to determine location.

377. Google Maps updates previous location data with more recent location information so as to give an accurate position for a user.

378. Google also tracks velocity (e.g., how fast you are going).

379. Google determines the physical position in the world’s frame of reference.

380. Google Maps utilizes a measured position, a previous position (e.g., last available position), and a previous velocity (e.g., speed with orientation) to derive a true position of the user.

381. The Accused IMU/GPS Products display the trajectory of a user on its graphic displaying unit that tracks a motion of the user.

382. A mapping application (e.g., Google Maps), can display the trajectory (e.g., track or course) of the user as indicated by a symbol such as an arrow or a line.

383. For example, the G3 has a 5.5-inch display and Google Maps that displays the trajectory of a user.

384. Direct infringement of claim 1 of the ’353 Patent occurs when LG and end users use an Accused IMU/GPS Products in a manner such that it practices the claimed method.

385. LG infringes claim 1 of the ’353 Patent by making and selling Accused IMU/GPS Products designed to practice the claimed process.

386. In addition, LG infringes claim 1 of the ’353 Patent by using the Accused IMU/GPS Products directly, including in relation to product testing.

387. In the alternative, LG induces infringement of claim 1 of the ’353 Patent by end users including by distributing the Accused IMU/GPS Products that practice the claimed process in ordinary use.

388. LG has knowledge of the ’353 Patent since at least April 5, 2016 and AGNC’s allegations of how the Accused IMU/GPS Products infringe claim 1 of the ’353 Patent since at least the date of this Complaint.

389. LG makes, uses, offers to sell, sells, and/or imports the Accused IMU/GPS Products knowing that LG has infringed and continues to infringe at least claim 1 of the ’353 Patent under 35 U.S.C. § 271(a) directly.

390. LG makes, uses, offers to sell, sells, and/or imports the Accused IMU/GPS Products knowing that LG’s customers and/or end users have directly infringed and are directly infringing each and every claim limitation of at least claim 1 of the ’353 Patent. LG actively induces customers and end-users to directly infringe each and every claim limitation of at least claim 1 of the ’353 Patent under 35 U.S.C. § 271(b).

391. LG has had actual knowledge of the ’353 Patent since at least April 5, 2016.

392. LG has been and is knowingly inducing its customers and/or end users to directly infringe at least claim 1 of the ’353 Patent with the specific intent to encourage such infringement, and knowing that the acts induced constitute patent infringement. LG’s inducement includes, for example, encouraging customers to turn on and use the Accused IMU/GPS Products by providing technical guides, product data sheets, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce its customers and/or end users to directly infringe at least claim 1 of the ’353 Patent by using the Accused IMU/GPS Products.

COUNT IX: INFRINGEMENT OF PAT. 6,792,353 CLAIM 2

393. AGNC reasserts and realleges paragraphs 1 through 75 and paragraphs 341 through 392 of this Complaint as though set forth fully here.

394. Claim 2 of the ’353 Patent provides:

Claim 2	An enhanced inertial measurement unit/global positioning system and map navigation process, as recited in claim 1, further comprising a step of displaying said retrieved geospatial data on said graphic displaying unit as a background.

395. The Accused IMU/GPS Products are used to meet each of the limitations of claim 2 of the ’353 Patent.

396. The Accused IMU/GPS Products contain a display.

397. The display device is used to display the geospatial data as a background.

398. For example, the G3 has a 5.5-inch display and Google Maps that displays the retrieved geospatial data as a background.

399. Direct infringement of claim 2 of the ’353 Patent occurs when LG or end users use an Accused IMU/GPS Product in a manner such that it practices the claimed method.

400. LG infringes claim 2 of the ’353 Patent by making and selling Accused IMU/GPS Products designed to practice the claimed process.

401. In addition, LG infringes claim 2 of the ’353 Patent by using the Accused IMU/GPS Products directly, including in relation to product testing.

402. In the alternative, LG induces infringement of claim 2 of the ’353 Patent by end users including by distributing the Accused IMU/GPS Products that practice the claimed process in ordinary use.

403. LG has knowledge of the ’353 Patent since at least April 5, 2016 and AGNC’s allegations of how the Accused IMU/GPS Products infringe claim 2 of the ’353 Patent since at least the date of this Complaint.

404. LG makes, uses, offers to sell, sells, and/or imports the Accused IMU/GPS Products knowing that LG has infringed and continues to infringe at least claim 2 of the ’353 Patent under 35 U.S.C. § 271(a) directly.

405. LG makes, uses, offers to sell, sells, and/or imports the Accused IMU/GPS Products knowing that LG’s customers and/or end users have directly infringed and are directly infringing each and every claim limitation of at least claim 2 of the ’353 Patent. LG actively induces customers and end-users to directly infringe each and every claim limitation of at least claim 2 of the ’353 Patent under 35 U.S.C. § 271(b).

406. LG has had actual knowledge of the ’353 Patent since at least April 5, 2016.

407. LG has been and is knowingly inducing its customers and/or end users to directly infringe at least claim 2 of the ’353 Patent with the specific intent to encourage such infringement, and knowing that the acts induced constitute patent infringement. LG’s inducement includes, for example, encouraging customers to turn on and use the Accused IMU/GPS Products by providing technical guides, product data sheets, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce its customers and/or end users to directly infringe at least claim 2 of the ’353 Patent by using the Accused IMU/GPS Products.

COUNT X: INFRINGEMENT OF PAT. 6,792,353 CLAIM 3

408. AGNC reasserts and realleges paragraphs 1 through 75, paragraphs 341 through 392, and paragraphs 393 through 407 of this Complaint as though set forth fully here.

409. Claim 3 of the ’353 Patent provides:

Claim 3	An enhanced inertial measurement unit/global positioning system and map navigation process, as recited in claim 2, further comprising a step of displaying an accurate position of said user on said graphic displaying unit as a mark.

410. The Accused IMU/GPS Products are used to meet each of the limitations of claim 3 of the ’353 Patent.

411. The Accused IMU/GPS Products contain a display.

412. The display device is used to display an accurate position of a user as a mark.

413. For example, the G3 has a 5.5-inch display and Google Maps that displays the accurate position of a user as a mark.

414. Direct infringement of claim 3 of the ’353 Patent occurs when LG and end users use an Accused IMU/GPS Product in a manner such that it practices the claimed method.

415. LG infringes claim 3 of the ’353 Patent by making and selling Accused IMU/GPS Products designed to practice the claimed process.

416. In addition, LG infringes claim 3 of the ’353 Patent by using the Accused IMU/GPS Products directly, including in relation to product testing.

417. In the alternative, LG induces infringement of claim 3 of the ’353 Patent by end users including by distributing the Accused IMU/GPS Products that practice the claimed process in ordinary use.

418. LG has knowledge of the ’353 Patent since at least April 5, 2016 and AGNC’s allegations of how the Accused IMU/GPS Products infringe claim 3 of the ’353 Patent since at least the date of this Complaint.

419. LG makes, uses, offers to sell, sells, and/or imports the Accused IMU/GPS Products knowing that LG has infringed and continues to infringe at least claim 3 of the ’353 Patent under 35 U.S.C. § 271(a) directly.

420. LG makes, uses, offers to sell, sells, and/or imports the Accused IMU/GPS Products knowing that LG’s customers and/or end users have directly infringed and are directly infringing each and every claim limitation of at least claim 3 of the ’353 Patent. LG actively induces customers and end-users to directly infringe each and every claim limitation of at least claim 3 of the ’353 Patent under 35 U.S.C. § 271(b).

421. LG has had actual knowledge of the ’353 Patent since at least April 5, 2016.

422. LG has been and is knowingly inducing its customers and/or end users to directly infringe at least claim 3 of the ’353 Patent with the specific intent to encourage such infringement, and knowing that the acts induced constitute patent infringement. LG’s inducement includes, for example, encouraging customers to turn on and use the Accused IMU/GPS Products by providing technical guides, product data sheets, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce its customers and/or end users to directly infringe at least claim 3 of the ’353 Patent by using the Accused IMU/GPS Products.

COUNT XI: INFRINGEMENT OF PAT. 6,792,353 CLAIM 6

423. AGNC reasserts and realleges paragraphs 1 through 75 of this Complaint as though set forth fully here.

424. Claim 6 of the ’353 Patent provides:

Preamble of Claim 6	An enhanced inertial measurement unit/global positioning system and map navigation process, comprising the steps of:
Element A	(a) receiving a position of a user from an inertial measurement unit/global positioning system device;
Element B	(b) converting a global coordinate to a local coordinate to match a coordinate system employed in a map database;
Element C	(c) retrieving geospatial data from a geospatial map database based on said measured position from said inertial measurement unit/global positioning system device by using a tile index file which stores geographic extent information of tiles; wherein said tiles are geographically subdividing a coverage solely for a purpose of enhancing data management; wherein a geographic extent of an access area is compared with said geographic extent of said tiles to derive a plurality of involved tiles for said access area;
Element D	(d) performing time-space filtering based on said measured position and said retrieved geospatial data from said geospatial map database to derive a displaying position for a user; wherein said measured position and a previous position and a previous velocity are used to derive a true position for said user; and
Element E	(e) performing coordinate conversion from said local coordinate to a pixel coordinate and displaying said position of said user on a graphic displaying unit.

425. The Accused IMU/GPS Products are used to meet each and every element of claim 6 of the ’353 Patent.

426. The Accused IMU/GPS Products are inertial measurement unit/global positioning systems that perform a map navigation process with a mapping application.

427. The Accused IMU/GPS Products have an Android operating system.

428. An Android operating system is pre-loaded on each Accused IMU/GPS Product before the product reaches the end-user.

429. Accused IMU/GPS Products contain Google Maps.

430. Google Maps is pre-loaded on each Accused IMU/GPS Product before the product reaches the end-user.

431. The Accused IMU/GPS Products contain a micro electro-mechanical ("MEMS") gyroscope.

432. The Accused IMU/GPS Products contain a MEMS accelerometer.

433. The Accused IMU/GPS Products contain a micro inertial measurement unit that comprises a MEMS gyroscope and MEMS accelerometer.

434. The Accused IMU/GPS Products contain a GPS transceiver.

435. The Accused IMU/GPS Products contain a display.

436. The Accused IMU/GPS Products receive a position from an integrated inertial measurement unit/global positioning system device (e.g., IMU and GPS).

437. The Accused IMU/GPS Products include a Qualcomm Snapdragon processor.

438. For example, the G3 has a Qualcomm Snapdragon 801 processor.

439. The Qualcomm Snapdragon processor has Qualcomm IZat location technology that provides ubiquitous location information indoors, outdoors, and in urban canyons).

440. The Qualcomm Snapdragon processor has Qualcomm IZat location technology that offers uninterrupted coverage.

441. The Accused IMU/GPS Products contain an IMU that is used for sensing motion measurements and produces positioning data.

442. The Accused IMU/GPS Products' Qualcomm Snapdragon processor's IZat location engine processes measurements from inertial sensors including accelerometers and gyroscopes.

443. The Accused IMU/GPS Products' GPS receiver provides positioning data.

444. Qualcomm's IZat contained in the Accused IMU/GPS Products uses positioning data from the IMU and positioning data from the GPS receiver to provide a measured position.

445. Google Maps is powered by the Fused Location Provider ("FLP") that combines GPS, Wi-Fi, cell, accelerometer, gyroscope, and magnetometer data and manages battery consumption.

446. The Android API incorporates sensor fusion algorithms that combine accelerometer, gyroscope, magnetometer, and barometer with raw GPS pseudoranges.

447. The Accused IMU/GPS Products convert a global coordinate (e.g., latitude and longitude) to a local coordinate to match a coordinate system used in a map database (for example, to load the proper map data).

448. The Accused IMU/GPS Products use a mapping application (e.g., Google Maps) to retrieve geospatial data from a geospatial map database.

449. The geospatial data is retrieved based on the measured positions from the IMU/GPS device.

450. The geospatial data is retrieved by using a tile index file.

451. The tile index file stores geographic extent information of tiles.

452. The tiles geographically subdivide a coverage for enhancing data management.

453. The Google Maps API determines which tiles are needed and translates that information into a set of tiles to retrieve.

454. The geographic extent of an access area (e.g., the access area that is encompassed within the display screen of an Accused IMU/GPS Products) is compared (e.g., using zoom level, map tile location in the grid, etc.) with the geographic extent of the tiles to determine a plurality of involved tiles for the access area.

455. The Accused IMU/GPS Products use IMU/GPS and a mapping application (e.g., Google Maps) to perform time-space-filtering based on the measured position of a device and the retrieved geospatial data from a geospatial map database.

456. Google Maps derives a position to be displayed for a user.

457. Google Maps uses several sources to determine location.

458. Google Maps updates previous location data with more recent location information so as to give an accurate position for a user.

459. Google also tracks velocity (e.g., how fast you are going).

460. Google determines the physical position in the world's frame of reference.

461. Google Maps utilizes a measured position, a previous position (e.g., last available), and a previous velocity (e.g., speed with orientation) to derive a true position of the user.

462. The Accused IMU/GPS Products convert the local coordinate to a pixel coordinate.

463. The Accused IMU/GPS Products display the position of a user on its graphic displaying unit.

464. A mapping application (e.g., Google Maps) displays the position of the user as indicated by a symbol such as a dot.

465. For example, the G3 has a 5.5-inch display and Google Maps that displays the position of a user.

466. Direct infringement of claim 6 of the ’353 Patent occurs when LG and end users use an Accused IMU/GPS Products in a manner such that it practices the claimed method.

467. LG infringes claim 6 of the ’353 Patent by making and selling Accused IMU/GPS Products designed to practice the claimed process.

468. In addition, LG infringes claim 6 of the ’353 Patent by using the Accused IMU/GPS Products directly, including in relation to product testing.

469. In the alternative, LG induces infringement of claim 6 of the ’353 Patent by end users including by distributing the Accused IMU/GPS Products that practice the claimed process in ordinary use.

470. LG has had knowledge of the ’353 Patent since at least April 5, 2016 and AGNC’s allegations of how the Accused IMU/GPS Products infringe claim 6 of the ’353 Patent since at least the date of this Complaint.

471. LG makes, uses, offers to sell, sells, and/or imports the Accused IMU/GPS Products knowing that LG has infringed and continues to infringe at least claim 1 of the ’353 Patent under 35 U.S.C. § 271(a) directly.

472. LG makes, uses, offers to sell, sells, and/or imports the Accused IMU/GPS Products knowing that LG’s customers and/or end users have directly infringed and are directly infringing each and every claim limitation of at least claim 6 of the ’353 Patent.

LG actively induces customers and end-users to directly infringe each and every claim limitation of at least claim 6 of the ’353 Patent under 35 U.S.C. § 271(b).

473. LG has had actual knowledge of the ’353 Patent since at least April 5, 2016.

474. LG has been and is knowingly inducing its customers and/or end users to directly infringe at least claim 6 of the ’353 Patent with the specific intent to encourage such infringement, and knowing that the acts induced constitute patent infringement. LG’s inducement includes, for example, encouraging customers to turn on and use the Accused IMU/GPS Products by providing technical guides, product data sheets, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce its customers and/or end users to directly infringe at least claim 6 of the ’353 Patent by using the Accused IMU/GPS Products.

COUNT XII: INFRINGEMENT OF PAT. 6,792,353 CLAIM 7

475. AGNC reasserts and realleges paragraphs 1 through 75 and paragraphs 423 through 474 of this Complaint as though set forth fully here.

476. Claim 7 of the ’353 Patent provides:

Claim 7	An enhanced inertial measurement unit/global positioning system and map navigation process, as recited as claim 6, wherein said inertial measurement unit/global positioning system device comprises a micro IMU, a GPS receiver and means for blending measurements from said micro IMU and said GPS receiver.

477. The Accused IMU/GPS Products are used to meet each of the limitations of claim 7 of the ’353 Patent.

478. The Accused IMU/GPS Products have an Android operating system.

479. An Android operating system is pre-loaded on each Accused IMU/GPS Product before the product reaches the end-user.

480. Accused IMU/GPS Products contain Google Maps.

481. Google Maps is pre-loaded on each Accused IMU/GPS Product before the product reaches the end-user.

482. The Accused IMU/GPS Products contain a micro electro-mechanical ("MEMS") gyroscope.

483. The Accused IMU/GPS Products contain a MEMS accelerometer.

484. The Accused IMU/GPS Products contain a micro inertial measurement unit that comprises a MEMS gyroscope and MEMS accelerometer.

485. The Accused IMU/GPS Products contain a GPS transceiver.

486. The Accused IMU/GPS Products contain a display.

487. The Accused IMU/GPS Products receive a position from an integrated inertial measurement unit/global positioning system device (e.g., IMU and GPS).

488. The Accused IMU/GPS Products include a Qualcomm Snapdragon processor.

489. For example, the G3 has a Qualcomm Snapdragon 801 processor.

490. The Qualcomm Snapdragon processor has Qualcomm IZat location technology that provides ubiquitous location information indoors, outdoors, and urban canyons.

491. The Qualcomm Snapdragon processor has Qualcomm IZat location technology that offers uninterrupted coverage.

492. The Accused IMU/GPS Products contain an IMU that is used for sensing motion measurements and produces positioning data.

493. The Accused IMU/GPS Products' Qualcomm Snapdragon processor's IZat location engine processes measurements from inertial sensors including accelerometers and gyroscopes.

494. The Accused IMU/GPS Products' GPS receiver provides positioning data.

495. Qualcomm's IZat contained in the Accused IMU/GPS Products uses positioning data from the IMU and positioning data from the GPS receiver to provide a measured position.

496. Google Maps is powered by the Fused Location Provider ("FLP") that combines GPS, Wi-Fi, cell, accelerometer, gyroscope, and magnetometer data and manages battery consumption.

497. The Accused IMU/GPS Products blend measurements from the IMU and GPS.

498. The Android API incorporates sensor fusion algorithms that combine accelerometer, gyroscope, magnetometer, and barometer with raw GPS pseudoranges.

499. Direct infringement of claim 7 of the '353 Patent occurs when LG and end users use an Accused IMU/GPS Products in a manner such that it practices the claimed method.

500. LG infringes claim 7 of the '353 Patent by making and selling Accused IMU/GPS Products designed to practice the claimed process.

501. In addition, LG infringes claim 7 of the '353 Patent by using the Accused IMU/GPS Products directly, including in relation to product testing.

502. In the alternative, LG induces infringement of claim 7 of the ’353 Patent by end users including by distributing the Accused IMU/GPS Products that practice the claimed process in ordinary use.

503. LG has had knowledge of the ’353 Patent since at least April 5, 2016 and AGNC’s allegations of how the Accused IMU/GPS Products infringe claim 7 of the ’353 Patent since at least the date of this Complaint.

504. LG makes, uses, offers to sell, sells, and/or imports the Accused IMU/GPS Products knowing that LG has infringed and continues to infringe at least claim 7 of the ’353 Patent under 35 U.S.C. § 271(a) directly.

505. LG makes, uses, offers to sell, sells, and/or imports the Accused IMU/GPS Products knowing that LG’s customers and/or end users have directly infringed and are directly infringing each and every claim limitation of at least claim 7 of the ’353 Patent. LG actively induces customers and end-users to directly infringe each and every claim limitation of at least claim 7 of the ’353 Patent under 35 U.S.C. § 271(b).

506. LG has had actual knowledge of the ’353 Patent since at least April 5, 2016.

507. LG has been and is knowingly inducing its customers and/or end users to directly infringe at least claim 7 of the ’353 Patent with the specific intent to encourage such infringement, and knowing that the acts induced constitute patent infringement. LG’s inducement includes, for example, encouraging customers to turn on and use the Accused IMU/GPS Products by providing technical guides, product data sheets, demonstrations, software and hardware specifications, installation guides, and other

forms of support that induce its customers and/or end users to directly infringe at least claim 7 of the ’353 Patent by using the Accused IMU/GPS Products.

COUNT XIII: INFRINGEMENT OF PAT. 6,415,227 CLAIM 1

508. AGNC reasserts and realleges paragraphs 1 through 75 of this Complaint as though set forth fully here.

509. Claim 1 of the ’227 Patent provides:

Preamble of Claim 1	An enhanced global positioning system and map navigation process, comprising said steps of:
Element A	(a) receiving a measured position from a global positioning system receiver;
Element B	(b) retrieving geospatial data from a geospatial map database based on said measured position from said global positioning system receiver by using a tile index file, wherein said tile index file stores geographic extent information of tiles which are geographically subdividing a coverage solely for a purpose of enhancing data management; wherein a geographic extent of an access area is compared with said geographic extent of said tiles to derive a plurality of involved tiles for said access area;
Element C	(c) performing time-space filtering based on said measured position and said retrieved geospatial data from said geospatial map database to derive a displaying position for a user; wherein said measured position and a previous position and a previous velocity are used to derive a true position for said user; and
Element D	(d) displaying a trajectory of said user on a graphic displaying unit, which tracks a motion of said user.

510. LG makes, uses, sells, offers for sale and imports wireless mobile devices, including mobile phones and tablets that include a GPS, map database (e.g., Google Maps) and a display (“Accused GPS System Products”). Accused GPS System Products include, for example, at least the LG G3, G2, Access, Escape 2, G Flex, G Flex 2, G Vista 2, Gizmo Pal 2, Aristo, Escape, G4, G5, K10, K3, K4, K7, K8, Optimus True, Optimus Zone 3, Power, Rebel LTE TracFone, Spree, Stylo 2, Stylo 2 Plus, Stylo 2 V,

Tribute, Tribute 2, V10, V20, X Power, X Style, Nexus 5X, G Pad 7.0, G Pad 8.0, G Pad II 8.0, G Pad II 8.3, G Pad II 10.1, G Pad III 8.0, and G Pad III 10.1.

511. LG has and continues to manufacture, use, sell, import, and/or offer for sale the Accused GPS System Products that are used to meet each and every element of claim 1 of the ’227 Patent.

512. The Accused GPS System Products include global positioning systems that perform a map navigation process with a mapping application (e.g., Google Maps).

513. Google Maps is pre-loaded on each Accused GPS System Product before the product reaches the end-user.

514. The Accused GPS System Products each contain a GPS transceiver.

515. The Accused GPS System Products each contain a display.

516. The Accused GPS System Products receive a measured position from a global positioning system receiver.

517. The Accused GPS System Products use a mapping application (e.g., Google Maps) to retrieve geospatial data from a geospatial map database.

518. The geospatial data is retrieved based on the measured positions from the GPS receiver.

519. The geospatial data is retrieved by using a tile index file.

520. The tile index file stores geographic extent information of tiles.

521. The tiles geographically subdivide a coverage for enhancing data management.

522. The Google Maps API determines which tiles are needed and translates that information into a set of tiles to retrieve.

523. The geographic extent of an access area (e.g., the access area that is encompassed within the display screen of an Accused GPS System Product) is compared (e.g., using zoom level, map tile location in the grid, etc.) with the geographic extent of the tiles to determine a plurality of involved tiles for the access area.

524. The Accused GPS System Products use GPS and a mapping application (e.g., Google Maps) to perform time-space-filtering based on the measured position of a device and the retrieved geospatial data from a geospatial map database.

525. The time-space filtering derives a displaying position for a user.

526. Google Maps uses several sources to determine location.

527. Google Maps updates previous location data with more recent location information so as to give an accurate position for a user.

528. Google also tracks velocity (e.g., how fast you are going).

529. Google determines the physical position in the world's frame of reference.

530. Google Maps uses a measured position, a previous position (e.g., last available position), and a previous velocity (e.g., speed with orientation) to derive a true position of the user.

531. The Accused GPS System Products display the trajectory of a user on its graphic displaying unit that tracks a motion of the user.

532. A mapping application (e.g., Google Maps), can display the trajectory (e.g., track or course) of the user as indicated by a symbol such as an arrow or a line.

533. For example, the G3 has a 5.5-inch display and Google Maps that displays a trajectory of a user.

534. Direct infringement of claim 1 of the ’227 Patent occurs when LG or end users use an Accused GPS System Product in a manner that practices the claimed method.

535. LG infringes claim 1 of the ’227 Patent by making and selling the Accused GPS System Products designed to practice the claimed process.

536. In addition, LG infringes claim 1 of the ’227 Patent by using the Accused GPS System Products directly, including in relation to product testing.

537. In the alternative, LG induces infringement of claim 1 of the ’227 Patent by end users including by distributing the Accused GPS System Products that practice the claimed process in ordinary use.

538. LG has knowledge of the ’227 Patent and AGNC’s allegations of how the Accused GPS System Products infringe claim 1 of the ’227 Patent since at least September 24, 2015.

539. LG makes, uses, offers to sell, sells, and/or imports the Accused GPS System Products knowing that LG has infringed and continues to infringe at least claim 1 of the ’227 Patent under 35 U.S.C. § 271(a) directly.

540. LG makes, uses, offers to sell, sells, and/or imports the Accused GPS System Products knowing that LG’s customers and/or end users have directly infringed and are directly infringing each and every claim limitation of at least claim 1 of the ’227 Patent. LG actively induces customers and end-users to directly infringe each and every claim limitation of at least claim 1 of the ’227 Patent under 35 U.S.C. § 271(b).

541. LG has had actual knowledge of the ’227 Patent since at least September 24, 2015.

542. LG has been and is knowingly inducing its customers and/or end users to directly infringe at least claim 1 of the ’227 Patent with the specific intent to encourage such infringement, and knowing that the acts induced constitute patent infringement. LG’s inducement includes, for example, encouraging customers to turn on and use the Accused GPS System Products by providing technical guides, product data sheets, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce its customers and/or end users to directly infringe at least claim 1 of the ’227 Patent by using the Accused GPS System Products.

COUNT XIV: INFRINGEMENT OF PAT. 6,415,227 CLAIM 2

543. AGNC reasserts and realleges paragraphs 1 through 75 and paragraphs 508 through 542 of this Complaint as though set forth fully here.

544. Claim 2 of the ’227 Patent provides:

Claim 2	An enhanced global positioning system and map navigation process, as recited in claim 1, before the step (c), further comprising a step of displaying said retrieved geospatial data on said graphic displaying unit as a background.

545. The Accused GPS System Products are used to meet each and every limitation of claim 2 of the ’227 Patent.

546. The Accused GPS System Products contain a display.

547. The display is used to display the geospatial data as a background.

548. For example, the G3 has a 5.5-inch display and Google Maps that displays the geospatial data as a background.

549. Direct infringement of claim 2 of the ’227 Patent occurs when LG or end users use an Accused GPS System Product in a manner that practices the claimed method.

550. LG infringes claim 2 of the ’227 Patent by making and selling the Accused GPS System Products designed to practice the claimed process.

551. In addition, LG infringes claim 2 of the ’227 Patent by using the Accused GPS System Products directly, including in relation to product testing.

552. In the alternative, LG induces infringement of claim 2 of the ’227 Patent by end users including by distributing the Accused GPS System Products that practice the claimed process in ordinary use.

553. LG has knowledge of the ’227 Patent since at least September 24, 2015 and AGNC’s allegations of how the Accused GPS Products infringe claim 2 of the ’227 Patent since at least the date of this Complaint.

554. LG makes, uses, offers to sell, sells, and/or imports the Accused GPS System Products knowing that LG has infringed and continues to infringe at least claim 2 of the ’227 Patent under 35 U.S.C. § 271(a) directly.

555. LG makes, uses, offers to sell, sells, and/or imports the Accused GPS System Products knowing that LG’s customers and/or end users have directly infringed and are directly infringing each and every claim limitation of at least claim 2 of the ’227 Patent. LG actively induces customers and end-users to directly infringe each and every claim limitation of at least claim 2 of the ’227 Patent under 35 U.S.C. § 271(b).

556. LG has had actual knowledge of the ’227 Patent since at least September 24, 2015.

557. LG has been and is knowingly inducing its customers and/or end users to directly infringe at least claim 2 of the ’227 Patent with the specific intent to encourage such infringement, and knowing that the acts induced constitute patent infringement. LG’s inducement includes, for example, encouraging customers to turn on and use the Accused GPS System Products by providing technical guides, product data sheets, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce its customers and/or end users to directly infringe at least claim 2 of the ’227 Patent by using the Accused GPS System Products.

COUNT XV: INFRINGEMENT OF PAT. 6,415,227 CLAIM 3

558. AGNC reasserts and realleges paragraphs 1 through 75, paragraphs 508 through 542, and paragraphs 543 through 557 of this Complaint as though set forth fully here.

559. Claim 3 of the ’227 Patent provides:

Claim 3	An enhanced global positioning system and map navigation process, as recited in claim 2, after the step (c), further comprising a step of displaying an accurate position of said user on said graphic displaying unit as a mark.

560. The Accused GPS System Products are used to meet each and every limitation of claim 3 of the ’227 Patent.

561. The Accused GPS System Products contain a display.

562. The display is used to display an accurate position of a user as a mark (e.g., pinpoint dot).

563. For example, the G3 has a 5.5-inch display and Google Maps that displays an accurate position of a user as a mark.

564. Direct infringement of claim 3 of the ’227 Patent occurs when LG or end users use an Accused GPS System Product in a manner that practices the claimed method.

565. LG infringes claim 3 of the ’227 Patent by making and selling the Accused GPS System Products designed to practice the claimed process.

566. In addition, LG infringes claim 3 of the ’227 Patent by using the Accused GPS System Products directly, including in relation to product testing.

567. In the alternative, LG induces infringement of claim 3 of the ’227 Patent by end users including by distributing the Accused GPS System Products that practice the claimed process in ordinary use.

568. LG has knowledge of the ’227 Patent since at least September 24, 2015 and AGNC’s allegations of how the Accused GPS System Products infringe claim 3 of the ’227 Patent since at least the date of this Complaint.

569. LG makes, uses, offers to sell, sells, and/or imports the Accused GPS System Products knowing that LG has infringed and continues to infringe at least claim 3 of the ’227 Patent under 35 U.S.C. § 271(a) directly.

570. LG makes, uses, offers to sell, sells, and/or imports the Accused GPS System Products knowing that LG’s customers and/or end users have directly infringed and are directly infringing each and every claim limitation of at least claim 3 of the ’227 Patent. LG actively induces customers and end-users to directly infringe each and every claim limitation of at least claim 3 of the ’227 Patent under 35 U.S.C. § 271(b).

571. LG has had actual knowledge of the ’227 Patent since at least September 24, 2015.

572. LG has been and is knowingly inducing its customers and/or end users to directly infringe at least claim 3 of the ’227 Patent with the specific intent to encourage such infringement, and knowing that the acts induced constitute patent infringement. LG’s inducement includes, for example, encouraging customers to turn on and use the Accused GPS System Products by providing technical guides, product data sheets, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce its customers and/or end users to directly infringe at least claim 3 of the ’227 Patent by using the Accused GPS System Products.

COUNT XVI: INFRINGEMENT OF PAT. 6,415,227 CLAIM 36

573. AGNC reasserts and realleges paragraphs 1 through 75 of this Complaint as though set forth fully here.

574. Claim 36 of the ’227 Patent provides:

Preamble of Claim 36	An enhanced global positioning system and map navigation process, comprising the steps of:
Element A	(a) receiving a position of a user from a position determination device;
Element B	(b) converting a global coordinate to a local coordinate to match a coordinate system employed in a map database:
Element C	(c) retrieving geospatial data from a geospatial map database based on said measured position from said global positioning system receiver by using a tile index file which stores geographic extent information of tiles; wherein said tiles are geographically subdividing a coverage solely for a purpose of enhancing data management; wherein a geographic extent of an access area is compared with said geographic extent of said tiles to derive a plurality of involved tiles for said access area.
Element D	(d) performing time-space filtering based on said measured position and said retrieved geospatial data from said geospatial map database to derive a displaying position for a user; wherein said measured position and a previous position and a previous velocity are used to derive a true position for said user; and
Element E	(e) performing coordinate conversion from said local coordinate to a pixel coordinate and displaying said position of said user on a graphic displaying unit.

575. The Accused GPS System Products are used to meet each and every limitation of claim 36 of the ’227 Patent.

576. The Accused GPS System Products are enhanced global positioning systems that perform a map navigation process with a mapping application.

577. Google Maps is pre-loaded on each Accused GPS System Product before the product reaches the end-user.

578. The Accused GPS System Products contain a GPS transceiver.

579. The Accused GPS System Products include a display.

580. The Accused GPS System Products receive a position from a positioning determination device, e.g., the global positioning system receiver.

581. The Accused GPS System Products convert a global coordinate (e.g., latitude and longitude) to a local coordinate to match a coordinate system used in a map database (for example, to load the proper map data).

582. The geospatial data is retrieved based on the measured positions from the GPS receiver.

583. The geospatial data is retrieved by using a tile index file.

584. The tile index file stores geographic extent information of tiles.

585. The tiles geographically subdivide a coverage for enhancing data management.

586. The Google Maps API determines which tiles are needed and translates that information into a set of tiles to retrieve.

587. The geographic extent of an access area (e.g., the access area that is encompassed within the display screen of an Accused GPS System Product) is compared

(e.g., using zoom level, map tile location in the grid, etc.) with the geographic extent of the tiles to determine a plurality of involved tiles for the access area.

588. The Accused GPS System Products use GPS and a mapping application (e.g., Google Maps) to perform time-space-filtering based on the measured position of a device and the retrieved geospatial data from a geospatial map database.

589. Google Maps derives a position for a user.

590. Google Maps uses several sources to determine location.

591. Google Maps updates previous location data with more recent location information so as to give an accurate position for a user.

592. Google also tracks velocity (e.g., how fast you are going).

593. Google determines the physical position in the world's frame of reference.

594. Google Maps uses a measured position, a previous position (e.g., last available position), and a previous velocity (e.g., speed with orientation) to derive a true position of the user.

595. The Accused GPS System Products convert the local coordinate to a pixel coordinate.

596. The Accused GPS System Products display the position of a user on its graphic displaying unit.

597. A mapping application (e.g., Google Maps), displays the position of the user as indicated by a symbol such as a dot.

598. For example, the G3 has a 5.5-inch display and Google Maps that display the position of a user.

599. Direct infringement of claim 36 of the ’227 Patent occurs when LG or end users use an Accused GPS System Products in a manner such that practices the claimed method.

600. LG infringes claim 36 of the ’227 Patent by making and selling the Accused GPS System Products designed to practice the claimed process.

601. In addition, LG infringes claim 36 of the ’227 Patent by using the Accused GPS System Products directly, including in relation to product testing.

602. In the alternative, LG induces infringement of claim 36 of the ’227 Patent by end users including by distributing the Accused GPS System Products that practice the claimed process in ordinary use.

603. LG has knowledge of the ’227 Patent since at least September 24, 2015 and AGNC’s allegations of how the Accused GPS System Products infringe claim 36 of the ’227 Patent since at least the date of this Complaint.

604. LG makes, uses, offers to sell, sells, and/or imports the Accused GPS System Products knowing that LG has infringed and continues to infringe at least claim 36 of the ’227 Patent under 35 U.S.C. § 271(a) directly.

605. LG makes, uses, offers to sell, sells, and/or imports the Accused GPS System Products knowing that LG’s customers and/or end users have directly infringed and are directly infringing each and every claim limitation of at least claim 36 of the ’227 Patent. LG actively induces customers and end-users to directly infringe each and every claim limitation of at least claim 36 of the ’227 Patent under 35 U.S.C. § 271(b).

606. LG has had actual knowledge of the ’227 Patent since at least September 24, 2015.

607. LG has been and is knowingly inducing its customers and/or end users to directly infringe at least claim 36 of the ’227 Patent with the specific intent to encourage such infringement, and knowing that the acts induced constitute patent infringement. LG’s inducement includes, for example, encouraging customers to turn on and use the Accused GPS System Products by providing technical guides, product data sheets, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce its customers and/or end users to directly infringe at least claim 36 of the ’227 Patent by using the Accused GPS System Products.

WILLFUL INFRINGEMENT

608. LG has infringed and continues to infringe the above identified claims of each of the Patents-in-Suit despite its knowledge of the Patents-in-Suit (at least as early as April 5, 2016), knowledge of how its accused systems/methods infringe the ’648, ’758, and ’283 patents since at least March 16, 2015, the ’227 patent since at least September 24, 2015, the ’122 and ’555 patents since at least March 3, 2016, and the ’353 patent since at least the date of this Complaint, and the objectively high likelihood that its actions constitute patent infringement.

609. LG’s infringement of the Patents-in-Suit is willful and deliberate, entitling AGNC to enhanced damages under 35 U.S.C. §284 and to attorneys’ fees and costs incurred in prosecuting this action under 35 U.S.C. §285.

JURY DEMAND

AGNC demands a trial by jury on all issues that may be so tried.

REQUEST FOR RELIEF

WHEREFORE, Plaintiff AGNC requests that this Court enter judgment in its favor and against Defendants LG Electronics Inc., LG Electronics U.S.A. Inc., LG Electronics MobileComm U.S.A., Inc., and LG Electronics Mobile Research U.S.A., LLC as follows:

A. Adjudging, finding, and declaring that LG has infringed the above-identified claims of each of the Patents-in-Suit under 35 U.S.C. § 271;

B. Awarding the past and future damages arising out of LG's infringement of the Patents-in-Suit to AGNC in an amount no less than a reasonable royalty, together with prejudgment and post-judgment interest, in an amount according to proof;

C. Adjudging, finding, and declaring that LG's infringement is willful and awarding enhanced damages and fees as a result of that willfulness under 35 U.S.C. § 284;

D. Adjudging, finding, and declaring that the Patents-in-Suit are valid and enforceable;

E. Awarding attorney's fees, costs, or other damages pursuant to 35 U.S.C. §§ 284 or 285 or as otherwise permitted by law; and

F. Granting AGNC such other further relief as is just and proper, or as the Court deems appropriate.

Dated: February 9, 2017

Respectfully submitted,

/s/ David Berten w/permission
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