

106. On information and belief, Samsung also knowingly induces and/or contributes to the infringement of at least claims 1-20 of the '416 patent by others. On information and belief, Samsung has had knowledge of the '416 patent, and its infringement of the '416 patent, since at least the filing of this Complaint. On information and belief, Samsung tests, demonstrates, or otherwise operates its Accused Products in the United States, thereby performing the claimed methods and directly infringing any asserted claims of the '416 patent requiring such operation. Similarly, Samsung's customers and the end users of the Accused Products test and/or operate the Accused Products in the United States in accordance with Samsung's instructions contained in, for example, its user manuals, thereby also performing the claimed methods and directly infringing the asserted claims of the Asserted Patents requiring such operation. *See* Ex. 40, Mussnug Declaration at ¶¶10-14, and 31.

107. Samsung also contributes to infringement of the '416 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation the Accused Products and the non-staple constituent parts of those products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '416 patent. These products are known by Samsung to be especially made or especially adapted for use in the infringement of the '416 patent. Samsung also contributes to the infringement of the '416 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation components, such as the solid state storage drives, of the Accused Products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '416 patent. The Accused Products are known by Samsung to be especially made or especially

adapted for use in the infringement of the '416 patent. Specifically, on information and belief, Samsung sells Accused Products, with knowledge that the devices are used for infringement, to resellers, retailers, and end users. End users of those products directly infringe the '416 patent. *See* Ex. 40, Mussnug Declaration at ¶¶10-14, and 31.

4. '190 Patent

108. Examination of Respondent Samsung's representative Accused Products, specifically the Samsung SSDs MZVLW256HEHP; MZVLW512HMJP; and Samsung end-user products: ArtPC; Notebook 9 (900X5N-X01); and 850 EVO, demonstrates that those products directly infringe at least claims 1-101 of the '190 patent both literally and under the doctrine of equivalents. Charts that apply independent claims 1, 29, 45, 59, 80, 98, and 100 of the '190 patent to Samsung's infringing representative Accused Products, including photographs of the physical Accused Products, are attached as Exhibit 42 (and photograph Exhibits attached to Mussnug Declaration).

109. Upon information and belief, the Samsung SSDs MZVLW256HEHP; MZVLW512HMJP; and 850 EVO all contain infringing turbo-write buffer functionality as shown in Exhibit 42. *See* Exs. 59 and 62. Thus, Exhibit 42 is representative for each of those Samsung SSDs, as well as for the Samsung end-user products that contain them, *e.g.*, Samsung ArtPC and Samsung Notebook 9 (900X5N-X01). On information and belief, Samsung also knowingly induces and/or contributes to the infringement of at least claims 1-101 of the '190 patent by others.

110. On information and belief, Samsung has had knowledge of the '190 patent, and its infringement of the '190 patent, since at least the filing of this Complaint. On information and belief, Samsung tests, demonstrates, or otherwise operates its Accused Products in the United States, thereby performing the claimed methods and directly infringing any asserted claims of the

'190 patent requiring such operation. Similarly, Samsung's customers and the end users of the Accused Products test and/or operate the Accused Products in the United States in accordance with Samsung's instructions contained in, for example, its user manuals, thereby also performing the claimed methods and directly infringing the asserted claims of the Asserted Patents requiring such operation. *See* Ex. 40, Mussgnug Declaration at ¶¶10, 11-14, and 31.

111. Samsung also contributes to infringement of the '190 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation the Accused Products and the non-staple constituent parts of those products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '190 patent. These products are known by Samsung to be especially made or especially adapted for use in the infringement of the '190 patent. Samsung also contributes to the infringement of the '190 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation components, such as the solid state storage drives, of the Accused Products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '190 patent. The Accused Products are known by Samsung to be especially made or especially adapted for use in the infringement of the '190 patent. Specifically, on information and belief, Samsung sells Accused Products, with knowledge that the devices are used for infringement, to resellers, retailers, and end users. End users of those products directly infringe the '190 patent. *See* Ex. 40, Mussgnug Declaration at ¶¶10, 11-14, and 31.

B. SK Hynix

1. '243 Patent

112. Examination of Respondent SK Hynix's representative Accused Products, specifically the SK Hynix processor/DRAM packages Qualcomm MSM8998 (Snapdragon 835) / SK Hynix H9HKNNNCRMMU (4GB LPDDR4X); and DRAM SK Hynix HBM2 demonstrates that those products directly infringe at least claims 1, 2, 11, and 12 of the '243 patent both literally and under the doctrine of equivalents. Charts that apply independent claim 1 of the '243 patent to SK Hynix's infringing representative Accused Products, including photographs of the physical Accused Products, are attached as Exhibits 48 and 49 (and photograph Exhibits attached to Mussgnug Declaration).

113. Upon information and belief, the SK Hynix processor/DRAM package Qualcomm MSM8998 (Snapdragon 835) / SK Hynix H9HKNNNCRMMU (4GB LPDDR4X) comprises an infringing stacked processor and memory as shown in Exhibit 48. *See* Ex. 54. Thus, Exhibit 48 is representative for each of those SK Hynix processor/DRAM packages.

114. Upon information and belief, the SK Hynix high-density memory HBM2 contains infringing stacked modules with TSVs as shown in Exhibit 49. *See* Ex. 63.

115. On information and belief, SK Hynix also knowingly induces and/or contributes to the infringement of at least claims 1, 2, 11, and 12 of the '243 patent by others. On information and belief, SK Hynix has had knowledge of the '243 patent, and its infringement of the '243 patent, since at least the filing of this Complaint. On information and belief, SK Hynix tests, demonstrates, or otherwise operates its Accused Products in the United States, thereby performing the claimed methods and directly infringing any asserted claims of the '243 patent requiring such operation. Similarly, SK Hynix's customers and the end users of the Accused Products test and/or operate

the Accused Products in the United States in accordance with SK Hynix's instructions contained in, for example, its user manuals, thereby also performing the claimed methods and directly infringing the asserted claims of the Asserted Patents requiring such operation. *See* Ex. 40, Mussnug Declaration at ¶¶25, 30.

116. SK Hynix also contributes to infringement of the '243 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation the Accused Products and the non-staple constituent parts of those products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '243 patent. These products are known by SK Hynix to be especially made or especially adapted for use in the infringement of the '243 patent. SK Hynix also contributes to the infringement of the '243 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation components, such as the solid state storage drives, of the Accused Products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '243 patent. The Accused Products are known by SK Hynix to be especially made or especially adapted for use in the infringement of the '243 patent. Specifically, on information and belief, SK Hynix sells Accused Products, with knowledge that the devices are used for infringement, to resellers, retailers, and end users. End users of those products directly infringe the '243 patent. *See* Ex. 40, Mussnug Declaration at ¶¶25, 30.

2. '103 Patent

117. Examination of Respondent SK Hynix's representative Accused Products, specifically the SK Hynix DRAM HBM2 demonstrates that those products directly infringe at least claims 12 and 16 of the '103 patent both literally and under the doctrine of equivalents. Charts

that apply independent claim 12 of the '103 patent to SK Hynix's infringing representative Accused Product, including photographs of the physical Accused Product, is attached as Exhibit 50 (and photograph Exhibits attached to Mussnug Declaration).

118. Upon information and belief, the SK Hynix high-density memory HBM2 contains infringing stacked modules with TSVs as shown in Exhibit 50. *See* Ex. 63. Thus, Exhibit 50 is representative of that SK Hynix high-density memory.

119. On information and belief, SK Hynix also knowingly induces and/or contributes to the infringement of at least claims 12 and 16 of the '103 patent by others. On information and belief, SK Hynix has had knowledge of the '103 patent, and its infringement of the '103 patent, since at least the filing of this Complaint. On information and belief, SK Hynix tests, demonstrates, or otherwise operates its Accused Products in the United States, thereby performing the claimed methods and directly infringing any asserted claims of the '103 patent requiring such operation. Similarly, SK Hynix's customers and the end users of the Accused Products test and/or operate the Accused Products in the United States in accordance with SK Hynix's instructions contained in, for example, its user manuals, thereby also performing the claimed methods and directly infringing the asserted claims of the Asserted Patents requiring such operation. *See* Ex. 40, Mussnug Declaration at ¶30.

120. SK Hynix also contributes to infringement of the '103 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation the Accused Products and the non-staple constituent parts of those products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '103 patent. These products are known by SK Hynix to be

especially made or especially adapted for use in the infringement of the '103 patent. SK Hynix also contributes to the infringement of the '103 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation components, such as the solid state storage drives, of the Accused Products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '103 patent. The Accused Products are known by SK Hynix to be especially made or especially adapted for use in the infringement of the '103 patent. Specifically, on information and belief, SK Hynix sells Accused Products, with knowledge that the devices are used for infringement, to resellers, retailers, and end users. End users of those products directly infringe the '103 patent. *See* Ex. 40, Mussnug Declaration at ¶30.

3. '416 Patent

121. Examination of Respondent SK Hynix's representative Accused Products, specifically the SK Hynix SSDs HFS256G39MND-3510A, HFS128G39TND-N210A, HFS256GD9MND-5510A; HFS256G32MND-2200A; HFS250G32TND-N1A2A; and SK Hynix end-user hard drives such as SL308 2.5 250GB SATA III TLC Internal Solid State Drive demonstrates that those products directly infringe at least claims 1-20 of the '416 patent both literally and under the doctrine of equivalents. Charts that apply independent claims 1, 6, 11 and 16 of the '416 patent to SK Hynix's infringing representative Accused Products, including photographs of the physical Accused Products, are attached as Exhibit 46 (and photograph Exhibits attached to Mussnug Declaration).

122. Upon information and belief, the SK Hynix SSDs HFS256G39MND-3510A, HFS128G39TND-N210A, HFS256GD9MND-5510A; HFS256G32MND-2200A; HFS250G32TND-N1A2A all contain infringing write-cache buffer flushing and garbage

collection functionality as shown in Exhibit 46. *See* Exs. 64-69. Thus, Exhibit 46 is also representative for each of those SK Hynix SSDs, as well as for the SK Hynix end-user products that contain them, *e.g.*, SK Hynix SL308 2.5 250GB SATA III.

123. On information and belief, SK Hynix also knowingly induces and/or contributes to the infringement of at least claims 1-20 of the '416 patent by others. On information and belief, SK Hynix has had knowledge of the '416 patent, and its infringement of the '416 patent, since at least the filing of this Complaint. On information and belief, SK Hynix tests, demonstrates, or otherwise operates its Accused Products in the United States, thereby performing the claimed methods and directly infringing any asserted claims of the '416 patent requiring such operation. Similarly, SK Hynix's customers and the end users of the Accused Products test and/or operate the Accused Products in the United States in accordance with SK Hynix's instructions contained in, for example, its user manuals, thereby also performing the claimed methods and directly infringing the asserted claims of the Asserted Patents requiring such operation. *See* Ex. 40, Mussnug Declaration at ¶¶2, 3, 7-9, and 27.

124. SK Hynix also contributes to infringement of the '416 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation the Accused Products and the non-staple constituent parts of those products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '416 patent. These products are known by SK Hynix to be especially made or especially adapted for use in the infringement of the '416 patent. SK Hynix also contributes to the infringement of the '416 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation

components, such as the solid state storage drives, of the Accused Products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '416 patent. The Accused Products are known by SK Hynix to be especially made or especially adapted for use in the infringement of the '416 patent. Specifically, on information and belief, SK Hynix sells Accused Products, with knowledge that the devices are used for infringement, to resellers, retailers, and end users. End users of those products directly infringe the '416 patent. *See* Ex. 40, Mussnug Declaration at ¶¶2, 3, 7-9, and 27.

4. '190 Patent

125. Examination of Respondent SK Hynix's representative Accused Products, specifically the SK Hynix SSD HFS250G32TND-N1A2A and SK Hynix end-user hard drives such as SL308 2.5 250GB SATA III TLC Internal Solid State Drive demonstrates that those products directly infringe at least claims 1-101 of the '190 patent both literally and under the doctrine of equivalents. Charts that apply independent claims 1, 29, 45, 59, 80, 98, and 100 of the '190 patent to SK Hynix's infringing representative Accused Products, including photographs of the physical Accused Products, are attached as Exhibit 47 (and photograph Exhibits attached to Mussnug Declaration).

126. Upon information and belief, the SK Hynix SSD HFS250G32TND-N1A2A contains infringing turbo-write buffer functionality as shown in Exhibit 47. *See* Ex. 70. Thus, Exhibit 47 is representative for that SK Hynix SSD, as well as for the SK Hynix end-user products that contains it, *e.g.*, SK Hynix SL308 2.5 250GB SATA III TLC Internal Solid State Drive.

127. On information and belief, SK Hynix also knowingly induces and/or contributes to the infringement of at least claims 1-101 of the '190 patent by others. On information and belief, SK Hynix has had knowledge of the '190 patent, and its infringement of the '190 patent, since at

least the filing of this Complaint. On information and belief, SK Hynix tests, demonstrates, or otherwise operates its Accused Products in the United States, thereby performing the claimed methods and directly infringing any asserted claims of the '190 patent requiring such operation. Similarly, SK Hynix's customers and the end users of the Accused Products test and/or operate the Accused Products in the United States in accordance with SK Hynix's instructions contained in, for example, its user manuals, thereby also performing the claimed methods and directly infringing the asserted claims of the Asserted Patents requiring such operation. *See* Ex. 40, Mussnug Declaration at ¶27.

128. SK Hynix also contributes to infringement of the '190 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation the Accused Products and the non-staple constituent parts of those products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '190 patent. These products are known by SK Hynix to be especially made or especially adapted for use in the infringement of the '190 patent. SK Hynix also contributes to the infringement of the '190 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation components, such as the solid state storage drives, of the Accused Products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '190 patent. The Accused Products are known by SK Hynix to be especially made or especially adapted for use in the infringement of the '190 patent. Specifically, on information and belief, SK Hynix sells Accused Products, with knowledge that the devices are used for infringement, to

resellers, retailers, and end users. End users of those products directly infringe the '190 patent. *See* Ex. 40, Mussnug Declaration at ¶27.

C. Dell

1. '416 Patent

129. Examination of Respondent Dell's representative Accused Products, specifically the Dell Alienware 13 R3 and Dell Inspiron P30E demonstrates that those products directly infringe at least claims 1-20 of the '416 patent both literally and under the doctrine of equivalents. Charts that apply independent claims 1, 6, 11 and 16 of the '416 patent to Dell's infringing representative Accused Products, including photographs of the physical Accused Products, are attached as Exhibit 46 (and photograph Exhibits attached to Mussnug Declaration).

130. The Dell Alienware 13 R3 and Dell Inspiron P30E devices contain SK Hynix SSDs HFS256GD9MND-5510A and HFS128G39TND-N210A, respectively. *See* Ex. 40, Mussnug Declaration at ¶¶7-8. Upon information and belief, those SSDs contain infringing write-cache buffer flushing and garbage collection functionality as shown in Exhibit 46. *See* Exs. 65-67. Thus, Exhibit 46 is representative for the Dell Alienware 13 R3 and Dell Inspiron P30E.

131. On information and belief, Dell also knowingly induces and/or contributes to the infringement of at least claims 1-20 of the '416 patent by others. On information and belief, Dell has had knowledge of the '416 patent, and its infringement of the '416 patent, since at least the filing of this Complaint. On information and belief, Dell tests, demonstrates, or otherwise operates its Accused Products in the United States, thereby performing the claimed methods and directly infringing any asserted claims of the '416 patent requiring such operation. Similarly, Dell's customers and the end users of the Accused Products test and/or operate the Accused Products in the United States in accordance with Dell's instructions contained in, for example, its user

manuals, thereby also performing the claimed methods and directly infringing the asserted claims of the Asserted Patents requiring such operation. *See* Ex. 40, Mussnug Declaration at ¶¶7-8.

132. Dell also contributes to infringement of the '416 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation the Accused Products and the non-staple constituent parts of those products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '416 patent. These products are known by Dell to be especially made or especially adapted for use in the infringement of the '416 patent. Dell also contributes to the infringement of the '416 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation components, such as the solid state storage drives, of the Accused Products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '416 patent. The Accused Products are known by Dell to be especially made or especially adapted for use in the infringement of the '416 patent. Specifically, on information and belief, Dell sells Accused Products, with knowledge that the devices are used for infringement, to resellers, retailers, and end users. End users of those products directly infringe the '416 patent. *See* Ex. 40, Mussnug Declaration at ¶¶7-8.

D. Lenovo

1. '416 Patent

133. Examination of Respondent Lenovo's representative Accused Products, specifically the Lenovo Ideapad 710S Plus Touch, demonstrates that those products directly infringe at least claims 1-20 of the '416 patent both literally and under the doctrine of equivalents. Charts that apply independent claims 1, 6, 11 and 16 of the '416 patent to Lenovo's infringing

representative Accused Product, including photographs of the physical Accused Product, are attached as Exhibit 41 (and photograph Exhibits attached to Mussgnug Declaration).

134. The Lenovo Ideapad 710S Plus Touch device contains Samsung SSD MZVLW512HMJP-000L2. *See* Ex. 40, Mussgnug Declaration at ¶11. Upon information and belief, that SSD contains infringing write-cache buffer flushing and garbage collection functionality as shown in Exhibit 41. *See* Exs. 58 and 60. Thus, Exhibit 41 is representative for the Lenovo Ideapad 710S Plus Touch device.

135. On information and belief, Lenovo also knowingly induces and/or contributes to the infringement of at least claims 1-20 of the '416 patent by others. On information and belief, Lenovo has had knowledge of the '416 patent, and its infringement of the '416 patent, since at least the filing of this Complaint. On information and belief, Lenovo tests, demonstrates, or otherwise operates its Accused Products in the United States, thereby performing the claimed methods and directly infringing any asserted claims of the '416 patent requiring such operation. Similarly, Lenovo's customers and the end users of the Accused Products test and/or operate the Accused Products in the United States in accordance with Lenovo's instructions contained in, for example, its user manuals, thereby also performing the claimed methods and directly infringing the asserted claims of the Asserted Patents requiring such operation. *See* Ex. 40, Mussgnug Declaration at ¶11.

136. Lenovo also contributes to infringement of the '416 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation the Accused Products and the non-staple constituent parts of those products, which are not suitable for substantial non-infringing use and which embody a material

part of the invention described in the '416 patent. These products are known by Lenovo to be especially made or especially adapted for use in the infringement of the '416 patent. Lenovo also contributes to the infringement of the '416 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation components, such as the solid state storage drives, of the Accused Products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '416 patent. The Accused Products are known by Lenovo to be especially made or especially adapted for use in the infringement of the '416 patent. Specifically, on information and belief, Lenovo sells Accused Products, with knowledge that the devices are used for infringement, to resellers, retailers, and end users. End users of those products directly infringe the '416 patent. *See* Ex. 40, Mussnug Declaration at ¶11.

2. '190 Patent

137. Examination of Respondent Lenovo's representative Accused Products, specifically the Lenovo Ideapad 710S Plus Touch, demonstrates that those products directly infringe at least claims 1-101 of the '190 patent both literally and under the doctrine of equivalents. Charts that apply independent claims 1, 29, 45, 59, 80, 98, and 100 of the '190 patent to Lenovo's infringing representative Accused Product, including photographs of the physical Accused Product, are attached as Exhibit 42 (and photograph Exhibits attached to Mussnug Declaration).

138. The Lenovo Ideapad 710S Plus Touch device contains Samsung SSD MZVLW512HMJP-000L2. *See* Ex. 40, Mussnug Declaration at ¶11. Upon information and belief, that SSD contains infringing turbo-write buffer functionality as shown in Exhibit 42. *See* Ex. 59. Thus, Exhibit 42 is representative for the Lenovo Ideapad 710S Plus Touch device.

139. On information and belief, Lenovo also knowingly induces and/or contributes to the infringement of at least claims 1-101 of the '190 patent by others. On information and belief, Lenovo has had knowledge of the '190 patent, and its infringement of the '190 patent, since at least the filing of this Complaint. On information and belief, Lenovo tests, demonstrates, or otherwise operates its Accused Products in the United States, thereby performing the claimed methods and directly infringing any asserted claims of the '190 patent requiring such operation. Similarly, Lenovo's customers and the end users of the Accused Products test and/or operate the Accused Products in the United States in accordance with Lenovo's instructions contained in, for example, its user manuals, thereby also performing the claimed methods and directly infringing the asserted claims of the Asserted Patents requiring such operation. *See* Ex. 40, Mussnug Declaration at ¶11.

140. Lenovo also contributes to infringement of the '190 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation the Accused Products and the non-staple constituent parts of those products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '190 patent. These products are known by Lenovo to be especially made or especially adapted for use in the infringement of the '190 patent. Lenovo also contributes to the infringement of the '190 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation components, such as the solid state storage drives, of the Accused Products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '190 patent. The Accused Products are known by Lenovo to be especially made or especially

adapted for use in the infringement of the '190 patent. Specifically, on information and belief, Lenovo sells Accused Products, with knowledge that the devices are used for infringement, to resellers, retailers, and end users. End users of those products directly infringe the '190 patent. *See* Ex. 40, Mussnug Declaration at ¶11.

E. HP

1. '416 Patent

141. Examination of Respondent HP's representative Accused Products, specifically the HP Spectre (13-v151nr) and HP EliteBook Revolve 810 G3, demonstrates that those products directly infringe at least claims 1-20 of the '416 patent both literally and under the doctrine of equivalents. Charts that apply independent claims 1, 6, 11 and 16 of the '416 patent to HP's infringing representative Accused Products, including photographs of the physical Accused Products, are attached as Exhibits 41 and 46 (and photograph Exhibits attached to Mussnug Declaration).

142. The HP EliteBook Revolve 810 G3 device contains SK Hynix SSD HFS256G39MND-3510A. *See* Ex. 40, Mussnug Declaration at ¶9. Upon information and belief, that SSD contains infringing write-cache buffer flushing and garbage collection functionality as shown in Exhibit 46. *See* Exs. 64 and 65. Thus, Exhibit 46 is representative for the HP EliteBook Revolve 810 G3 device.

143. The HP Spectre 13-v151nr device contains Samsung SSD MZVLW256HEHP-000H1. *See* Ex. 40, Mussnug Declaration at ¶10. Upon information and belief, that SSD contains infringing write-cache buffer flushing and garbage collection functionality as shown in Exhibit 41. *See* Exs. 57 and 58. Thus, Exhibit 41 is representative for the HP Spectre 13-v151nr device.

144. On information and belief, HP also knowingly induces and/or contributes to the infringement of at least claims 1-20 of the '416 patent by others. On information and belief, HP has had knowledge of the '416 patent, and its infringement of the '416 patent, since at least the filing of this Complaint. On information and belief, HP tests, demonstrates, or otherwise operates its Accused Products in the United States, thereby performing the claimed methods and directly infringing any asserted claims of the '416 patent requiring such operation. Similarly, HP's customers and the end users of the Accused Products test and/or operate the Accused Products in the United States in accordance with HP's instructions contained in, for example, its user manuals, thereby also performing the claimed methods and directly infringing the asserted claims of the Asserted Patents requiring such operation. *See* Ex. 40, Mussgnug Declaration at ¶¶9-10.

145. HP also contributes to infringement of the '416 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation the Accused Products and the non-staple constituent parts of those products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '416 patent. These products are known by HP to be especially made or especially adapted for use in the infringement of the '416 patent. HP also contributes to the infringement of the '416 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation components, such as the solid state storage drives, of the Accused Products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '416 patent. The Accused Products are known by HP to be especially made or especially adapted for use in the infringement of the '416 patent. Specifically, on information and belief, HP sells Accused

Products, with knowledge that the devices are used for infringement, to resellers, retailers, and end users. End users of those products directly infringe the '416 patent. *See* Ex. 40, Mussgnug Declaration at ¶¶9-10.

2. '190 Patent

146. Examination of Respondent HP's representative Accused Products, specifically the HP Spectre (13-v151nr), demonstrates that those products directly infringe at least claims 1-101 of the '190 patent both literally and under the doctrine of equivalents. Charts that apply independent claims 1, 29, 45, 59, 80, 98, and 100 of the '190 patent to HP's infringing representative Accused Product, including photographs of the physical Accused Product, are attached as Exhibit 42 (and photograph Exhibits attached to Mussgnug Declaration).

147. The HP Spectre (13-v151nr) device contains Samsung SSD MZVLW256HEHP-000H1. *See* Ex. 40, Mussgnug Declaration at ¶10. Upon information and belief, that SSD contains infringing turbo-write buffer functionality as shown in Exhibit 42. *See* Ex. 59. Thus, Exhibit 42 is representative for the HP Spectre (13-v151nr) device.

148. On information and belief, HP also knowingly induces and/or contributes to the infringement of at least claims 1-101 of the '190 patent by others. On information and belief, HP has had knowledge of the '190 patent, and its infringement of the '190 patent, since at least the filing of this Complaint. On information and belief, HP tests, demonstrates, or otherwise operates its Accused Products in the United States, thereby performing the claimed methods and directly infringing any asserted claims of the '190 patent requiring such operation. Similarly, HP's customers and the end users of the Accused Products test and/or operate the Accused Products in the United States in accordance with HP's instructions contained in, for example, its user manuals,

thereby also performing the claimed methods and directly infringing the asserted claims of the Asserted Patents requiring such operation. *See* Ex. 40, Mussnug Declaration at ¶10.

149. HP also contributes to infringement of the '190 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation the Accused Products and the non-staple constituent parts of those products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '190 patent. These products are known by HP to be especially made or especially adapted for use in the infringement of the '190 patent. HP also contributes to the infringement of the '190 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation components, such as the solid state storage drives, of the Accused Products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '190 patent. The Accused Products are known by HP to be especially made or especially adapted for use in the infringement of the '190 patent. Specifically, on information and belief, HP sells Accused Products, with knowledge that the devices are used for infringement, to resellers, retailers, and end users. End users of those products directly infringe the '190 patent. *See* Ex. 40, Mussnug Declaration at ¶10.

F. ASUS

1. '416 Patent

150. Examination of Respondent ASUS's representative Accused Products, specifically the ASUS Zenbook UX303, demonstrates that those products directly infringe at least claims 1-20 of the '416 patent both literally and under the doctrine of equivalents. Charts that apply independent claims 1, 6, 11 and 16 of the '416 patent to ASUS's infringing representative Accused

Product, including photographs of the physical Accused Product, are attached as Exhibit 46 (and photograph Exhibits attached to Musssnug Declaration).

151. The ASUS Zenbook UX303 device contains SK Hynix SSD HFS256G32MND-2200A. *See* Ex. 40, Musssnug Declaration at ¶3. Upon information and belief, that SSD contains infringing write-cache buffer flushing and garbage collection functionality as shown in Exhibit 46. *See* Exs. 65 and 68. Thus, Exhibit 46 is representative for the ASUS Zenbook UX303 device.

152. On information and belief, ASUS also knowingly induces and/or contributes to the infringement of at least claims 1-20 of the '416 patent by others. On information and belief, ASUS has had knowledge of the '416 patent, and its infringement of the '416 patent, since at least the filing of this Complaint. On information and belief, ASUS tests, demonstrates, or otherwise operates its Accused Products in the United States, thereby performing the claimed methods and directly infringing any asserted claims of the '416 patent requiring such operation. Similarly, ASUS's customers and the end users of the Accused Products test and/or operate the Accused Products in the United States in accordance with ASUS's instructions contained in, for example, its user manuals, thereby also performing the claimed methods and directly infringing the asserted claims of the Asserted Patents requiring such operation. *See* Ex. 40, Musssnug Declaration at ¶3.

153. ASUS also contributes to infringement of the '416 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation the Accused Products and the non-staple constituent parts of those products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '416 patent. These products are known by ASUS to be especially made or especially adapted for use in the infringement of the '416 patent. ASUS also contributes to the

infringement of the '416 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation components, such as the solid state storage drives, of the Accused Products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '416 patent. The Accused Products are known by ASUS to be especially made or especially adapted for use in the infringement of the '416 patent. Specifically, on information and belief, ASUS sells Accused Products, with knowledge that the devices are used for infringement, to resellers, retailers, and end users. End users of those products directly infringe the '416 patent. *See* Ex. 40, Mussnug Declaration at ¶3.

2. '243 Patent

154. Examination of Respondent ASUS's representative Accused Products, specifically the ASUS ZenFone AR (ZS571KL) 8GB, demonstrates that those products directly infringe at least claims 1, 2, 11, and 12 of the '243 patent both literally and under the doctrine of equivalents. Charts that apply independent claim 1 of the '243 patent to ASUS's infringing representative Accused Product, including photographs of the physical Accused Product, are attached as Exhibit 43 (and photograph Exhibits attached to Mussnug Declaration).

155. The ASUS ZenFone AR (ZS571KL) 8GB device contains the Samsung processor/DRAM package MSM8996 pro (QC Snapdragon 821) / Samsung K3RG6G60MM-MGCJ (6GB LPDDR). *See* Ex. 40, Mussnug Declaration at ¶6. Upon information and belief, that processor/DRAM package contains stacked processor and memory as shown in Exhibit 43. *See* Ex. 53. Thus, Exhibit 43 is representative for the ASUS ZenFone AR (ZS571KL) 8GB.

156. On information and belief, ASUS also knowingly induces and/or contributes to the infringement of at least claims 1, 2, 11, and 12 of the '243 patent by others. On information and

belief, ASUS has had knowledge of the '243 patent, and its infringement of the '243 patent, since at least the filing of this Complaint. On information and belief, ASUS tests, demonstrates, or otherwise operates its Accused Products in the United States, thereby performing the claimed methods and directly infringing any asserted claims of the '243 patent requiring such operation. Similarly, ASUS's customers and the end users of the Accused Products test and/or operate the Accused Products in the United States in accordance with ASUS's instructions contained in, for example, its user manuals, thereby also performing the claimed methods and directly infringing the asserted claims of the Asserted Patents requiring such operation. *See* Ex. 40, Mussnug Declaration at ¶6.

157. ASUS also contributes to infringement of the '243 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation the Accused Products and the non-staple constituent parts of those products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '243 patent. These products are known by ASUS to be especially made or especially adapted for use in the infringement of the '243 patent. ASUS also contributes to the infringement of the '243 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation components, such as the solid state storage drives, of the Accused Products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '243 patent. The Accused Products are known by ASUS to be especially made or especially adapted for use in the infringement of the '243 patent. Specifically, on information and belief, ASUS sells Accused Products, with knowledge that the devices are used for infringement, to resellers, retailers, and end

users. End users of those products directly infringe the '243 patent. *See* Ex. 40, Mussnug Declaration at ¶6.

G. Acer

1. '416 Patent

158. Examination of Respondent Acer's representative Accused Products, specifically the Acer Aspire E15 E5-553, demonstrates that those products directly infringe at least claims 1-20 of the '416 patent both literally and under the doctrine of equivalents. Charts that apply independent claims 1, 6, 11 and 16 of the '416 patent to Acer's infringing representative Accused Product, including photographs of the physical Accused Product, are attached as Exhibit 46 (and photograph Exhibits attached to Mussnug Declaration).

159. The Acer Aspire E15 E5-553 device contains SK Hynix SSD HFS128G39TND-N210A. *See* Ex. 40, Mussnug Declaration at ¶2. Upon information and belief, that SSD contains infringing write-cache buffer flushing and garbage collection functionality as shown in Exhibit 46. *See* Exs. 65 and 66. Thus, Exhibit 46 is representative for the Acer Aspire E15 E5-553 device.

160. On information and belief, Acer also knowingly induces and/or contributes to the infringement of at least claims 1-20 of the '416 patent by others. On information and belief, Acer has had knowledge of the '416 patent, and its infringement of the '416 patent, since at least the filing of this Complaint. On information and belief, Acer tests, demonstrates, or otherwise operates its Accused Products in the United States, thereby performing the claimed methods and directly infringing any asserted claims of the '416 patent requiring such operation. Similarly, Acer's customers and the end users of the Accused Products test and/or operate the Accused Products in the United States in accordance with Acer's instructions contained in, for example, its user

manuals, thereby also performing the claimed methods and directly infringing the asserted claims of the Asserted Patents requiring such operation. *See* Ex. 40, Mussnug Declaration at ¶2.

161. Acer also contributes to infringement of the '416 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation the Accused Products and the non-staple constituent parts of those products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '416 patent. These products are known by Acer to be especially made or especially adapted for use in the infringement of the '416 patent. Acer also contributes to the infringement of the '416 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation components, such as the solid state storage drives, of the Accused Products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '416 patent. The Accused Products are known by Acer to be especially made or especially adapted for use in the infringement of the '416 patent. Specifically, on information and belief, Acer sells Accused Products, with knowledge that the devices are used for infringement, to resellers, retailers, and end users. End users of those products directly infringe the '416 patent. *See* Ex. 40, Mussnug Declaration at ¶2.

H. VAIO and Transcosmos

1. '416 Patent

162. Examination of Respondents VAIO's and Transcosmos' representative Accused Products, specifically the VAIO Z VJZ131A11L, demonstrates that those products directly infringe at least claims 1-20 of the '416 patent both literally and under the doctrine of equivalents. Charts that apply independent claims 1, 6, 11 and 16 of the '416 patent to VAIO's and

Transcosmos' infringing representative Accused Product, including photographs of the physical Accused Product, are attached as Exhibit 41 (and photograph Exhibits attached to Mussnug Declaration).

163. The VAIO Z VJZ131A11L device contains Samsung SSD MZVLW256HEHP-00000. *See* Ex. 40, Mussnug Declaration at ¶31. Upon information and belief, that SSD contains infringing write-cache buffer flushing and garbage collection functionality as shown in Exhibit 41. *See* Exs. 57 and 58. Thus, Exhibit 41 is representative for the VAIO Z VJZ131A11 device.

164. On information and belief, VAIO and Transcosmos also knowingly induce and/or contribute to the infringement of at least claims 1-20 of the '416 patent by others. On information and belief, VAIO and Transcosmos have had knowledge of the '416 patent, and their infringement of the '416 patent, since at least the filing of this Complaint. On information and belief, VAIO and Transcosmos test, demonstrate, or otherwise operate their Accused Products in the United States, thereby performing the claimed methods and directly infringing any asserted claims of the '416 patent requiring such operation. Similarly, VAIO's and Transcosmos' customers and the end users of the Accused Products test and/or operate the Accused Products in the United States in accordance with VAIO's and Transcosmos' instructions contained in, for example, the product's user manuals, thereby also performing the claimed methods and directly infringing the asserted claims of the Asserted Patents requiring such operation. *See* Ex. 40, Mussnug Declaration at ¶31.

165. VAIO and Transcosmos also contribute to infringement of the '416 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation the Accused Products and the non-staple constituent parts of those products, which are not suitable for substantial non-infringing use and which embody

a material part of the invention described in the '416 patent. These products are known by VAIO and Transcosmos to be especially made or especially adapted for use in the infringement of the '416 patent. VAIO and Transcosmos also contribute to the infringement of the '416 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation components, such as the solid state storage drives, of the Accused Products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '416 patent. The Accused Products are known by VAIO and Transcosmos to be especially made or especially adapted for use in the infringement of the '416 patent. Specifically, on information and belief, VAIO and Transcosmos sell Accused Products, with knowledge that the devices are used for infringement, to resellers, retailers, and end users. End users of those products directly infringe the '416 patent. *See* Ex. 40, Mussnug Declaration at ¶31.

2. '190 Patent

166. Examination of Respondent VAIO's and Transcosmos' representative Accused Products, specifically the VAIO Z VJZ131A11L, demonstrates that those products directly infringe at least claims 1-101 of the '190 patent both literally and under the doctrine of equivalents. Charts that apply independent claims 1, 29, 45, 59, 80, 98, and 100 of the '190 patent to VAIO's and Transcosmos' infringing representative Accused Product, including photographs of the physical Accused Product, are attached as Exhibit 42 (and photograph Exhibits attached to Mussnug Declaration).

167. The VAIO Z VJZ131A11L device contains Samsung SSD MZVLW256HEHP-00000. *See* Ex. 40, Mussnug Declaration at ¶31. Upon information and belief, that SSD contains

infringing turbo-write buffer functionality as shown in Exhibit 42. *See* Ex. 59. Thus, Exhibit 42 is representative for the VAIO Z VJZ131A11L device.

168. On information and belief, VAIO and Transcosmos also knowingly induce and/or contribute to the infringement of at least claims 1-101 of the '190 patent by others. On information and belief, VAIO and Transcosmos have had knowledge of the '190 patent, and their infringement of the '190 patent, since at least the filing of this Complaint. On information and belief, VAIO and Transcosmos test, demonstrate, or otherwise operate their Accused Products in the United States, thereby performing the claimed methods and directly infringing any asserted claims of the '190 patent requiring such operation. Similarly, VAIO's and Transcosmos' customers and the end users of the Accused Products test and/or operate the Accused Products in the United States in accordance with VAIO's and Transcosmos' instructions contained in, for example, the product's user manuals, thereby also performing the claimed methods and directly infringing the asserted claims of the Asserted Patents requiring such operation. *See* Ex. 40, Mussnug Declaration at ¶31.

169. VAIO and Transcosmos also contribute to infringement of the '190 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation the Accused Products and the non-staple constituent parts of those products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '190 patent. These products are known by VAIO and Transcosmos to be especially made or especially adapted for use in the infringement of the '190 patent. VAIO and Transcosmos also contribute to the infringement of the '190 patent by selling for importation into the United States, importing into the United States, and/or selling within the United States after importation components, such as the solid state storage drives, of

the Accused Products, which are not suitable for substantial non-infringing use and which embody a material part of the invention described in the '190 patent. The Accused Products are known by VAIO and Transcosmos to be especially made or especially adapted for use in the infringement of the '190 patent. Specifically, on information and belief, VAIO and Transcosmos sell Accused Products, with knowledge that the devices are used for infringement, to resellers, retailers, and end users. End users of those products directly infringe the '190 patent. *See* Ex. 40, Mussnug Declaration at ¶31.

VIII. RELATED LITIGATION

170. The Asserted Patents are not now and have never been the subject of litigation before any other court or agency.

IX. RELIEF REQUESTED

WHEREFORE, by reason of the foregoing, Complainant respectfully requests that the United States International Trade Commission:

(a) Institute an investigation pursuant to Section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337, with respect to the proposed Respondents' violations of that section arising from the importation into the United States, sale for importation, and/or the sale within the United States after importation of solid state storage drives, stacked electronics components, and products containing same that infringe one or more claims of the Asserted Patents;

(b) Schedule and conduct a hearing pursuant to Section 337(c) for the purposes of (i) receiving evidence and hearing argument concerning whether there has been a violation of Section 337, and (ii) following the hearing, determining that there has been a violation of Section 337;

(c) Issue permanent limited exclusion orders directed to products manufactured by or on behalf of each proposed Respondent, their subsidiaries, related companies, and agents pursuant

to 19 U.S.C. § 1337(d) excluding entry into the United States of solid state storage drives, stacked electronics components, and products containing same that infringe one or more claims of the Asserted Patents;

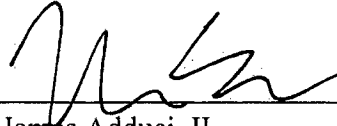
(d) Issue permanent cease and desist orders pursuant to 19 U.S.C. § 1337(f) prohibiting each proposed Respondent, their domestic subsidiaries, related companies, and agents from engaging in the importation, sale for importation, marketing and/or advertising, distribution, offering for sale, sale, use after importation, sale after importation, and other transfer within the United States of solid state storage drives, stacked electronics components, and products containing same that infringe one or more claims of the Asserted Patents;

(e) Impose a bond upon importation of solid state storage drives, stacked electronics components, and products containing same that infringe one or more claims of the Asserted Patents, during the 60-day Presidential review period pursuant to 19 U.S.C. § 1337(j); and

(f) Issue such other and further relief as the Commission deems just and proper under the law, based on the facts determined by the investigation and the authority of the Commission.

Dated: December 21, 2017

Respectfully submitted,



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