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

M-RED INC.,	§ § §	Case No.
Plaintiff,	§ §	**JURY TRIAL DEMANDED**
v.	§ §	
ONEPLUS TECHNOLOGY (SHENZHEN) CO. LTD.,	§ § § §	
Defendant.	§ §	

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff M-Red Inc. ("M-Red" or "Plaintiff") for its Complaint against OnePlus Technology (Shenzhen) Co., Ltd. ("OnePlus" or "Defendant") alleges as follows:

THE PARTIES

1.   M-Red is a corporation organized and existing under the laws of the State of Texas, with its principal place of business located at 100 W. Houston Street, Marshall, Texas 75670.

2.   On information and belief, OnePlus is a corporation organized and existing under the laws of China with a principal place of business at the 18F, Tairan Building, Block C, Tairan 8th Road, Chegongmiao, Futian District, Shenzhen, Guangdong 518040, China. OnePlus may be served with process pursuant to the provisions of the Hague Convention. OnePlus may also be served with process by serving the Texas Secretary of State at 1019 Brazos Street, Austin, Texas 78701 as its agent for service because it engages in business in Texas but has not designated or maintained a resident agent for service of process in Texas as required by statute.

3.   OnePlus is a leading manufacturer and seller of consumer electronics devices, including streaming media players, smart devices, IoT devices, smartphones, and audio devices,

in the United States. Upon information and belief, OnePlus does business in Texas and in the Eastern District of Texas directly and through intermediaries.

JURISDICTION AND VENUE

4.   This is an action for patent infringement arising under the patent laws of the United States, 35 U.S.C. §§ 1, *et seq*. This Court has jurisdiction over this action pursuant to 28 U.S.C. §§ 1331 and 1338(a).

5.   This Court has personal jurisdiction over OnePlus. OnePlus regularly conducts business and has committed acts of patent infringement and/or has induced acts of patent infringement by others in this Judicial District and/or has contributed to patent infringement by others in this Judicial District, the State of Texas, and elsewhere in the United States.

6.   OnePlus is subject to this Court's jurisdiction pursuant to due process and/or the Texas Long Arm Statute due at least to their substantial business in this State and Judicial District, including (a) at least part of their past infringing activities, (b) regularly doing or soliciting business in Texas, and/or (c) engaging in persistent conduct and/or deriving substantial revenue from goods and services provided to customers in Texas.

7.   For example, OnePlus (i) has done and continues to do business in the State of Texas; (ii) OnePlus has committed and continues to commit acts of patent infringement in the State of Texas, including making, using, offering to sell, and/or selling Accused Products in Texas, and/or importing Accused Products into Texas, including by Internet sales and sales via retail and wholesale stores, inducing others to commit acts of patent infringement in Texas, and/or committing at least a portion of any other infringements alleged herein; and (iii) OnePlus has regularly placed its products within the stream of commerce—directly, through subsidiaries, or through third parties—with the expectation and knowledge that such products, such as consoles

and accessories, will be shipped to, sold, or used in Texas and elsewhere in the United States. Accordingly, OnePlus has established minimum contacts within Texas and purposefully availed itself of the benefits of Texas, and the exercise of personal jurisdiction over OnePlus would not offend traditional notions of fair play and substantial justice.

8.   OnePlus purposefully directs and controls the sale of the Accused Products into established United States distribution channels, including sales to nationwide retailers and for sale in Texas. OnePlus further places the Accused Products into international supply chains, knowing that the Accused Products will be sold in the United States, including Texas.

9.   OnePlus further sells and offers to sell Accused Products to customers in the United States through its online store at https://www.oneplus.com. OnePlus is responsible for sales and offers to sell through its online store. For example, https://www.oneplus.com includes a user agreement that imposes "legally binding" terms between users and OnePlus Technology (Shenzhen) Co., Ltd.[1] OnePlus further runs a "Trade-in Program," "Referral Program," and "Affiliate Program" through its website to market and sell the Accused Products in the United States.

10.   On information and belief, OnePlus derived substantial revenues from such infringing acts, including from its sales of infringing devices in the United States.

11.   In addition, on information and belief, each OnePlus knowingly contributed to or induced infringement by others within this Judicial District, including end users, by advertising, marketing, offering for sale, and selling such devices to distributers, resellers, partners, and/or end users in this Judicial District, and by providing instructions, user manuals, advertising, and/or

---

[1] https://www.oneplus.com/legal/user-agreement?from=foot; *see also* https://www.oneplus.com/legal/privacy-policy?from=foot

marketing materials which facilitated, directed, or encouraged the use of their infringing functionality.

12.   Venue is proper in this Judicial District pursuant to 28 U.S.C. § 1391 because, among other things, OnePlus does not reside in the United States, and thus may be sued in any judicial district pursuant to 28 U.S.C. § 1391(c)(3).

PATENTS-IN-SUIT

13.   On February 8, 2005, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 6,853,259 (the "'259 Patent") entitled "Ring oscillator dynamic adjustments for auto calibration." A true and correct copy of the '259 Patent is available at https://pdfpiw.uspto.gov/.piw?PageNum=0&docid=06853259.

14.   On June 27, 2006, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 7,068,557 (the "'557 Patent") entitled "Ring oscillator dynamic adjustments for auto calibration." A true and correct copy of the '557 Patent is available at https://pdfpiw.uspto.gov/.piw?PageNum=0&docid=07068557.

15.   On April 24, 2007, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 7,209,401 (the "'401 Patent") entitled "Ring oscillator dynamic adjustments for auto calibration." A true and correct copy of the '401 Patent is available at https://pdfpiw.uspto.gov/.piw?PageNum=0&docid=07209401.

16.   On January 23, 2001, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 6,177,843 (the "'843 Patent") entitled "Oscillator circuit controlled by programmable logic." A true and correct copy of the '843 Patent is available at https://pdfpiw.uspto.gov/.piw?PageNum=0&docid=06177843.

17.   On September 30, 2003, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 6,628,171 (the "'171 Patent") entitled "Method, architecture and circuit for controlling and/or operating an oscillator." A true and correct copy of the '171 Patent is available at https://pdfpiw.uspto.gov/.piw?PageNum=0&docid=06628171.

18.   The '259, '557, and '401 Patents (the "Norman Patents") generally describe integrated circuits comprising voltage and temperate sensors which output a voltage and temperate and store the output in memory. The technology was developed by Robert D. Norman and Dominik J. Schmidt. The Norman Patents also describe methods for dynamically adjusting clock frequency based on voltage and temperature values. In some embodiments of the inventions, temperature sensors dynamically monitor environmental parameters and store these parameters on a memory. These techniques are incorporated into integrated circuits ("ICs") and software utilized in OnePlus Accused Products. For example, this functionality is included and utilized in Qualcomm System-on-a-Chips ("SoCs") used in OnePlus Accused Products, such as the Qualcomm Snapdragon 845 and Qualcomm WCN3990 Wi-Fi SoC included in the OnePlus 6 smartphone.[2]

19.   For example, OnePlus makes, uses, sells, offers for sale, and imports products with Qualcomm SoCs, including the Snapdragon line of SoCs, and associated software, which can perform Dynamic Clock and Voltage Scaling ("DCVS").[3] According to Qualcomm, DCVS "is a technique used to adjust the frequency and voltage of the power equation to deliver the needed performance at the ideal power level." Additionally, the "CPU cores of Snapdragon processors lie on separate voltage and frequency planes. This allows each CPU core to hit independent

---

[2] https://www.ifixit.com/Teardown/OnePlus+6+Teardown/109826
[3] DCVS may alternately be referred to as Dynamic Frequency and Voltage Scaling ("DVFS")

frequencies and voltages, delivering scalable performance and power levels."[4] On information

and belief, Qualcomm SoCs include a Thermal Engine that works with frequency and voltage

scaling to "cap the maximum operating frequency of the CPU."[5] Qualcomm SoCs are

incorporated into OnePlus Accused Products, such as the OnePlus 6 Smartphone. Qualcomm

SoCs further calibrate the frequency of a processor, such as to adjust for frequency drift due to

temperature and voltage variations.[6] On information and belief, a processor writes adjustment

values to a RAM and/or register file, the output of which is applied to an oscillator to maintain an

operating point.[7] For example, on information and belief, the global clock controller module of

an APQ8016 comprises phase-locked loop circuits which include a register configured to receive

temperature and voltage outputs from temperature and voltage sensors, and to store compensation

data associated with those outputs in order to maintain an operating frequency despite variations

in temperature and voltage conditions. For example, GPLL1 of the APQ8016 includes a

CONFIG_CTL register containing bits (*i.e.* memory) for specifying configuration control settings

of "noise measurement oscillation frequency control" and "[phase frequency detection] reset pulse

width adjustment." At least these control settings include functionality to compensate for "noise"

in a voltage controlled oscillator output frequency (*e.g.* drift and/or skew due to temperature and

voltage variations), and to shorten or lengthen the delay of a ring oscillator by modifying a pulse

width.

---

[4] Power vs. Performance Management of the CPU, Qualcomm, (retrieved April 29, 2019),
https://www.qualcomm.com/news/onq/2013/10/25/power-vs-performance-management-cpu
[5] Qualcomm Snapdragon 410E Processor APQ8016E System Power Overview, Qualcomm
(retrieved April 29, 2019), https://developer.qualcomm.com/qfile/35136/lm80-p0436-
73_a_qualcomm_snapdragon_410e_processor_apq8016e_system_power_overview.pdf&usg=A
OvVaw2fQ9dLyNcd-8h3Rd_-vbbM
[6] *See* https://developer.qualcomm.com/qfile/35466/lm80-p2751-5_c.pdf at 10
[7] *See id.* at 21.

8.3.10.3.13   0x00020014 GCC_GPLL1_CONFIG_CTL

Type: RW

Clock: CLK

Reset State: 0x00031000

This register contains register bits for specifying GPLL1 configuration control settings.

GCC_GPLL1_CONFIG_CTL

Bits	Name	Description
31:30	RESERVE_BITS31_30	–
29	FORCE_PFD_UP	Force PFD Up (force_PFD<1>). 0 Normal operation (default). 1 Force PFD UP -> 1
28	FORCE_PFD_DOWN	Force PFD down (force_PFD<0>). 0 Normal operation (default). 1 Force PFD DN -> 1
27:26	NMOSC_FREQ_CTRL	Noise measurement oscillator frequency control. 00: Highest (2.8 GHz at TT / 1.05 V / 40°C) (default) 01: 1/2 highest 10: 1/3 highest 11: 1/4 highest
25:24	PFD_DZSEL	PFD reset pulse width adjustment (PFD_dzsel<1:0>). 00 1x delay (default) 01: 2x delay 10: 3x delay 11: 4x delay
23	NMOSC_EN	Noise measurement oscillator control (nmosc_en) 0: Disable (default) 1: Enable
22	RESERVE_BIT22	–

See e.g., Qualcomm Snapdragon 410e Processor (APQ8016E) Technical Reference Manual at
2645,   available   at   https://developer.qualcomm.com/qfile/35259/lm80-p0436-
100_c_snapdragon410e_apq8016e_technicalreferencemanual_verc.pdf

20.   The '843 and '171 Patents (the "Chou Patents") generally describe methods and
apparatuses to present an output signal having a frequency from an oscillator, including and/or
utilizing (i) a reference signal, (ii) a control signal and (iii) the output signal. The technology was

developed by Richard Chou, Pidugu L. Narayana, and Paul H. Scott. In some embodiments of the invention, a logic circuit may be configured to present the control signal in response to (i) the output signal and (ii) the reference signal. For example, the logic circuit may disable the oscillator when the output signal oscillates outside a predetermined range. In some embodiments of the invention, the oscillator may be implemented as a phase-locked loop (PLL) with reference signal or as a voltage-controlled oscillator (VCO). The signal may prevent the VCO from "running" away by maintaining the frequency of the oscillation of the signal VCO_OUT within a number of predefined criteria that may avoid the runaway condition. These techniques are incorporated into integrated circuits ("ICs") and software utilized in OnePlus Accused Products. For example, this functionality is included and utilized in Qualcomm System-on-a-Chips ("SoCs") used in OnePlus Accused Products, such as the Qualcomm Snapdragon 845 and Qualcomm WCN3990 Wi-Fi SoC included in the OnePlus 6 smartphone.[8]

21.   For example, OnePlus makes, uses, sells, offers for sale, and imports products using Qualcomm SoCs with "watchdog" functionality that infringes the Chou Patents. For example, the OnePlus Accused Products use Linux-based SoCs that implement watchdog functionality through hardware (*e.g.,* a hardware circuit corresponding with a device node in a /dev/watchdog directory), and software (*e.g.,* a kernel timer in a /dev/watchdog directory and/or other platform-specific implementations).[9]

---

[8] https://www.ifixit.com/Teardown/OnePlus+6+Teardown/109826
[9] https://www.programmersought.com/article/16015070422/;
https://www.programmersought.com/article/96024752062/#:~:text=Watchdog%20is%20mainly
%20used%20in,CPU%20runaway%2C%20etc.);
https://www.programmersought.com/article/42626850394/

22.   For example, the PLLs and Clocks of Qualcomm Snapdragon SoCs include watchdog timers, and further include configurable Watchdog timer disable inputs.[10]   Qualcomm SoCs implement watchdog functionality through hardware and software to disable oscillators, such as a CPU oscillator in a runaway state:
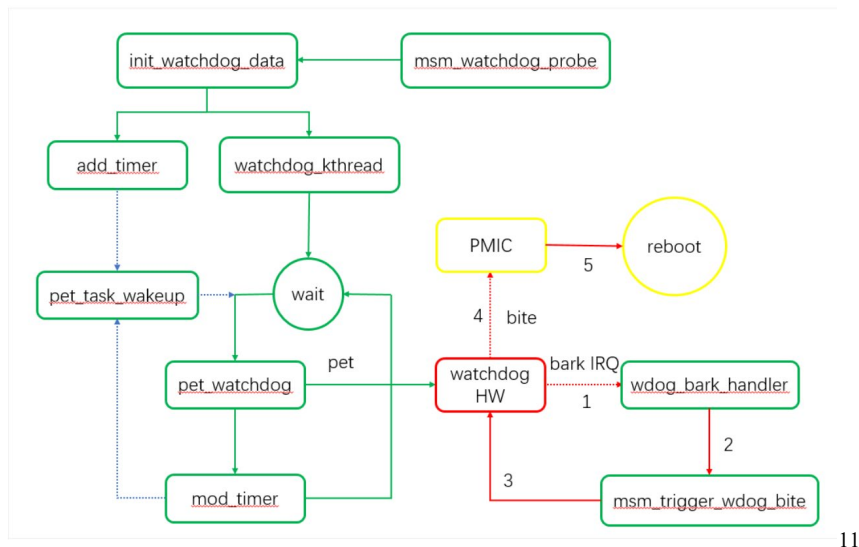
23.   OnePlus has infringed and is continuing to infringe the '259, '557, '401, '843, and '171 Patents (the "Asserted Patents") by making, using, selling, offering to sell, and/or importing, and by actively inducing others to make, use, sell, offer to sell and/or importing, products that utilize semiconductors including, but not limited to, Qualcomm ICs (the "Accused Products"). The Accused Products infringe the Norman and Chou Patents at least because they include ICs such as all versions, generations, and models of Snapdragon series chips (*e.g.,* MSM7xxx, MSM8xxx, SDM6xx, SDM8xx, APQ8xxx), Qualcomm series mobile platform chips (*e.g.,* QSC4xx, QSC6xxx), Qualcomm/Atheros wireless/Bluetooth series chips (*e.g.,* QCA4xxx,

---

[10] Ex. F at 25, 66.

[11]

https://www.programmersought.com/article/96024752062/#:~:text=Watchdog%20is%20mainly%20used%20in,CPU%20runaway%2C%20etc.)

QCA6xxx, QCA9xxx, WCN3xxx, IPQ8xxx, CSR1xxx, QCC5xxx, QCC3xxx), and Qualcomm

Smart Audio series chips (*e.g.,* QSC2xx, QSC4xx) Smart Audio ("Exemplary Qualcomm SoCs").

24.   M-Red has at all times complied with the marking provisions of 35 U.S.C. § 287

with respect to the Asserted Patents. On information and belief, prior assignees and licensees have

also complied with the marking provisions of 35 U.S.C. § 287.

COUNT I
(Infringement of the '259 Patent)

25.   Paragraphs 1 through 24 are incorporated by reference as if fully set forth herein.

26.   M-Red has not licensed or otherwise authorized OnePlus to make, use, offer for

sale, sell, or import any products that embody the inventions of the '259 Patent.

27.   OnePlus has and continues to directly infringe the '259 Patent, either literally or

under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, by making,

using, offering to sell, selling, and/or importing into the United States products that satisfy each

and every limitation of one or more claims of the '259 Patent. Upon information and belief,

OnePlus Accused Products include Qualcomm SoCs, such as the OnePlus 6 incorporating a

Qualcomm SoC such as the Exemplary Qualcomm SoCs.

28.   For example, OnePlus has and continues to directly infringe at least claim 1 of the

'259 Patent by making, using, offering to sell, selling, and/or importing into the United States

products that include an apparatus to compensate for voltage and temperature variations on an

integrated circuit, such as, for example, the thermal controller components and associated software

utilized with the Accused Products such as OnePlus Accused Products that incorporate Exemplary

Qualcomm SoCs. The Exemplary Qualcomm SoCs, such as the SoCs utilized in the OnePlus 6

includes a voltage sensor. The Exemplary Qualcomm SoCs each operate at different voltages and

frequencies and dynamically adjust these voltages and frequencies based on outputs from sensors.

29.   OnePlus has and continues to directly infringe at least claim 1 of the '259 Patent by making, using, offering to sell, selling, and/or importing into the United States products that include an apparatus to compensate for voltage and temperature variations on an integrated circuit, comprising: a voltage sensor having a digital voltage output; a temperature sensor having a digital temperature output; a register coupled to the voltage sensor and the temperature sensor, the register adapted to concatenate the digital voltage output and the temperature output into an address output; and a memory device having an address input coupled to the address output of the register, the memory device being adapted to store one or more corrective vectors.

30.   On information and belief, the Accused Products include SoCs that include a voltage sensor having a voltage output, and a temperature sensor having a temperature output. For example, on information and belief, the Qualcomm SoC used in the OnePlus 6 includes a voltage sensor. For example, the Exemplary Qualcomm SoCs, each include one or more temperature and voltage sensors that provide outputs stored in one or more registers.

31.   On information and belief, the Qualcomm SoCs used in the OnePlus 6 include a register coupled to the voltage sensor and the temperature sensor, the register adapted to concatenate the voltage output and the temperature output into an address output. On information and belief, the Qualcomm SoC used in the OnePlus 6 includes one or more registers including registers that store voltage and temperature information related to the performance of the temperature sensors, the thermal controller, and the voltage states of the SoC and its cores. For example, upon information and belief, the one or more registers of the Exemplary Qualcomm SoCs are adapted to combine the digital voltage and temperature in order to determine whether to alter the performance of the processor.

32.   On information and belief, the Qualcomm SoCs used in the OnePlus 6 include a memory device having an address input coupled to the address output of the register, the memory device being adapted to store one or more corrective vectors. On information and belief, the Qualcomm SoC used in the OnePlus 6 includes RAM, cache memory, and buffer memory to store corrective vectors, such as commands to increase or decrease the frequency and/or voltage of the SoC via, such as by implementing dynamic voltage and frequency scaling (DVFS), and/or by compensating for clock drift. For example, the Exemplary Qualcomm SoCs each include a "dynamic GPU clock and voltage scaling"[12] functionality that is used to "lower or raise the voltage when performance changes are made to the core."[13]

33.   OnePlus has and continues to indirectly infringe one or more claims of the '259 Patent by knowingly and intentionally inducing others, including OnePlus customers and end users of the Accused Products and products that include the Accused Products, to directly infringe, either literally or under the doctrine of equivalents, by making, using, offering to sell, selling, and/or importing into the United States products that include infringing technology, such as the OnePlus 6 incorporating a Qualcomm SoC such as the Exemplary Qualcomm SoCs.

34.   OnePlus, with knowledge that these products, or the use thereof, infringe the '259 Patent at least as of the date of this Complaint, knowingly and intentionally induced, and continues to knowingly and intentionally induce, direct infringement of the '259 Patent by providing these

---

[12] https://www.qualcomm.com/media/documents/files/qualcomm-snapdragon-400-product-brief.pdf

[13] Qualcomm Snapdragon 410E Processor APQ8016E System Power Overview, Qualcomm (retrieved April 29, 2019), https://developer.qualcomm.com/qfile/35136/lm80-p0436-73_a_qualcomm_snapdragon_410e_processor_apq8016e_system_power_overview.pdf&usg=AOvVaw2fQ9dLyNcd-8h3Rd_-vbbM

products to customers and ultimately to end users for use in an infringing manner in the United

States including, but not limited to, end users of products that incorporate Accused Products.

36.   OnePlus induced infringement by others, including end users, with the intent to

cause infringing acts by others or, in the alternative, with the belief that there was a high probability

that others, including end users, infringe the '259 Patent, but while remaining willfully blind to the

infringement.

36.   M-Red has suffered damages as a result of OnePlus's direct and indirect

infringement of the '259 Patent in an amount to be proved at trial.

37.   M-Red has suffered, and will continue to suffer, irreparable harm as a result of

OnePlus's infringement of the '259 Patent, for which there is no adequate remedy at law, unless

OnePlus's infringement is enjoined by this Court.

COUNT II
(Infringement of the '557 Patent)

38.   Paragraphs 1 through 24 are incorporated by reference as if fully set forth herein.

39.   M-Red has not licensed or otherwise authorized OnePlus to make, use, offer for

sale, sell, or import any products that embody the inventions of the '557 Patent.

40.   OnePlus has and continues to directly infringe the '557 Patent, either literally or

under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, by making,

using, offering to sell, selling, and/or importing into the United States products that satisfy each

and every limitation of one or more claims of the '557 Patent. Upon information and belief, these

products include OnePlus SoCs and products that incorporate OnePlus SoCs, including at least the

Exemplary OnePlus SoCs, which are sold in the United States and incorporated by others into

products sold in the United States. Upon information and belief, these products further include

OnePlus Accused Products incorporating Qualcomm SoCs, including at least the OnePlus 6 incorporating a Qualcomm SoC such as the Exemplary Qualcomm SoCs.

41.   For example, OnePlus has and continues to directly infringe at least claim 1 of the '557 Patent by making, using, offering to sell, selling, and/or importing into the United States products that include an integrated circuit comprising a voltage sensor having a voltage input; a temperature sensor having a temperature input; and a memory capable of receiving an input address based upon the voltage output and the temperature output, the memory configured to store compensation data.   On information and belief, such integrated circuits include, by way of example, the Accused Products that include thermal controller components and associated software, such as the Exemplary OnePlus SoCs, products that incorporate the Exemplary OnePlus SoCs, and OnePlus Accused Products that incorporate Exemplary Qualcomm SoCs. For example, the Accused Products operate at different voltages and frequencies and dynamically adjust these voltages and frequencies based on outputs from sensors.   On information and belief, such integrated circuits include, by way of example, Qualcomm SoCs included in OnePlus Accused Products such as the OnePlus 6 that include thermal controller components and associated software, such as the Exemplary Qualcomm SoCs. For example, Qualcomm SoCs operate at different voltages and frequencies and dynamically adjust these voltages and frequencies based on outputs from sensors.

42.   On information and belief, the Accused Products include a voltage sensor having a voltage output, and a temperature sensor having a temperature output.   For example, on information and belief, the Qualcomm SoCs used in OnePlus Accused Products, such as the Exemplary Qualcomm SoCs utilized in the OnePlus 6, include one or more temperature and voltage sensors that provide outputs.

14

43.   On information and belief, the Accused Products further include storage capable of receiving an input address based upon the voltage output and the temperature output, and the memory configured to store compensation data. For example, on information and belief, the Qualcomm SoCs used in OnePlus Accused Products, such as the Exemplary Qualcomm SoCs utilized in the OnePlus 6, include RAM, cache memory and buffer memory capable of receiving an input address based upon the voltage output and temperature output, and are configured to store compensation data, such as commands to increase or decrease the frequency and/or voltage of the SoCs. For example, the Qualcomm SoCs incorporated in the Accused Products each include "Thermal Engine" functionality that works with frequency and voltage scaling to "cap the maximum operating frequency of the CPU."[14]

44.   OnePlus has and continues to indirectly infringe one or more claims of the '557 Patent by knowingly and intentionally inducing others, including OnePlus customers and end users of the Accused Products and products that include the Accused Products, to directly infringe, either literally or under the doctrine of equivalents, by making, using, offering to sell, selling, and/or importing into the United States products that include infringing technology, such as the OnePlus 6 incorporating a Qualcomm SoC such as the Exemplary Qualcomm SoCs.

45.   OnePlus, with knowledge that these products, or the use thereof, infringe the '557 Patent at least as of the date of this Complaint, knowingly and intentionally induced, and continues to knowingly and intentionally induce, direct infringement of the '557 Patent by providing these

---

[14] Qualcomm Snapdragon 410E Processor APQ8016E System Power Overview, Qualcomm (retrieved April 29, 2019), https://developer.qualcomm.com/qfile/35136/lm80-p0436-73_a_qualcomm_snapdragon_410e_processor_apq8016e_system_power_overview.pdf&usg=AOvVaw2fQ9dLyNcd-8h3Rd_-vbbM

products to customers and ultimately to end users for use in an infringing manner in the United States including, but not limited to, end users of products that incorporate Accused Products,

46.   OnePlus induced infringement by others, including end users, with the intent to cause infringing acts by others or, in the alternative, with the belief that there was a high probability that others, including end users, infringe the '557 Patent, but while remaining willfully blind to the infringement.

47.   M-Red has suffered damages as a result of OnePlus's direct and indirect infringement of the '557 Patent in an amount to be proved at trial.

48.   M-Red has suffered, and will continue to suffer, irreparable harm as a result of OnePlus's infringement of the '557 Patent, for which there is no adequate remedy at law, unless OnePlus's infringement is enjoined by this Court.

COUNT III
(Infringement of the '401 Patent)

49.   Paragraphs 1 through 24 are incorporated by reference as if fully set forth herein.

50.   M-Red has not licensed or otherwise authorized OnePlus to make, use, offer for sale, sell, or import any products that embody the inventions of the '401 Patent.

51.   OnePlus has and continues to directly infringe the '401 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, by making, using, offering to sell, selling, and/or importing into the United States products that satisfy each and every limitation of one or more claims of the '401 Patent. Upon information and belief, these products include OnePlus SoCs and products that incorporate OnePlus SoCs, including at least the Exemplary OnePlus SoCs, which are sold in the United States and incorporated by others into products sold in the United States. Upon information and belief, these products further include

OnePlus Accused Products incorporating Qualcomm SoCs, including at least the OnePlus 6 incorporating a Qualcomm SoC such as the Exemplary Qualcomm SoCs.

52.   For example, OnePlus has and continues to directly infringe at least claim 1 of the '401 Patent by making, using, offering to sell, selling, and/or importing into the United States products that include an integrated circuit comprising: a voltage sensor having a voltage output; a temperature sensor having a temperature output; an analog-to-digital converter ("ADC") coupled to the voltage sensor and the temperature sensor, the ADC to convert the voltage output and the temperature output to digital values; and a storage coupled to receive an input address based upon at least one of the voltage output and temperature output, the storage configured to store compensation data, for example, the thermal controller components and associated software utilized with the Accused Products, such as the Exemplary OnePlus SoCs, products that incorporate the Exemplary OnePlus SoCs, and OnePlus Accused Products that incorporate Exemplary Qualcomm SoCs. For example, on information and belief, the Exemplary Qualcomm SoCs each include a voltage sensor having a digital voltage output. For example, the Exemplary Qualcomm SoCs incorporated in OnePlus Accused Products operate at different voltages and frequencies and dynamically adjust these voltages and frequencies based on outputs from sensors.

53.   On information and belief, the Qualcomm SoCs used in the OnePlus 6 include a voltage sensor having a voltage output, and a temperature sensor having a temperature output. For example, on information and belief, Qualcomm SoCs such as the Exemplary Qualcomm SoCs, incorporated in the OnePlus 6, include one or more temperature and voltage sensors that provide outputs.

54.   On information and belief, the Qualcomm SoCs used in the OnePlus 6 include an analog-to-digital converter coupled to the voltage sensor and the temperature sensor, the ADC to

convert the voltage output and the temperature output to digital values. For example, on information and belief, Qualcomm SoCs such as the Exemplary Qualcomm SoCs, incorporated in the OnePlus 6, include sensors which output analog signals which are converted to digital signals prior to storage.

55.   On information and belief, the Qualcomm SoCs incorporated in the OnePlus 6 further include a storage capable of receiving an input address based upon the voltage output and the temperature output, the memory configured to store compensation data. For example, on information and belief, Qualcomm SoCs such as the Exemplary Qualcomm SoCs, incorporated in the OnePlus 6, include ram, cache memory, and buffer memory capable of receiving an input address based upon the voltage output and temperature output, and are configured to store compensation data, such as commands to increase or decrease the frequency and/or voltage of the SoC. For example, the Qualcomm SoCs incorporated in OnePlus Accused Products each include "Thermal Engine" functionality that works with frequency and voltage scaling to "cap the maximum operating frequency of the CPU."[15]

56.   OnePlus has and continues to indirectly infringe one or more claims of the '401 Patent by knowingly and intentionally inducing others, including OnePlus customers and end users of the Accused Products and products that include the Accused Products, to directly infringe, either literally or under the doctrine of equivalents, by making, using, offering to sell, selling and/or importing into the United States products that include infringing technology, such as the OnePlus 6 incorporating a Qualcomm SoC such as the Exemplary Qualcomm SoCs.

---

[15] Qualcomm Snapdragon 410E Processor APQ8016E System Power Overview, Qualcomm (retrieved April 29, 2019), https://developer.qualcomm.com/qfile/35136/lm80-p0436-73_a_qualcomm_snapdragon_410e_processor_apq8016e_system_power_overview.pdf&usg=AOvVaw2fQ9dLyNcd-8h3Rd_-vbbM

57.   OnePlus, with knowledge that these products, or the use thereof, infringe the '401 Patent at least as of the date of this Complaint, knowingly and intentionally induced, and continues to knowingly and intentionally induce, direct infringement of the '401 Patent by providing these products to customers and ultimately to end users for use in an infringing manner in the United States including, but not limited to, end users of products that incorporate Accused Products.

58.   OnePlus induced infringement by others, including end users, with the intent to cause infringing acts by others or, in the alternative, with the belief that there was a high probability that others, including end users, infringe the '401 Patent, but while remaining willfully blind to the infringement.

59.   M-Red has suffered damages as a result of OnePlus's direct and indirect infringement of the '401 Patent in an amount to be proved at trial.

60.   M-Red has suffered, and will continue to suffer, irreparable harm as a result of OnePlus's infringement of the '401 Patent, for which there is no adequate remedy at law, unless OnePlus's infringement is enjoined by this Court.

COUNT IV
(Infringement of the '843 Patent)

61.   Paragraphs 1 through 24 are incorporated by reference as if fully set forth herein.

62.   M-Red has not licensed or otherwise authorized OnePlus to make, use, offer for sale, sell, or import any products that embody the inventions of the '843 Patent.

63.   OnePlus has and continues to directly infringe the '843 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, by making, using, offering to sell, selling, and/or importing into the United States products that satisfy each and every limitation of one or more claims of the '843 Patent. Upon information and belief, these

products include at least the OnePlus Accused Products incorporating Qualcomm SoCs, such as at least the OnePlus 6 incorporating the Exemplary Qualcomm SoCs.

64.   For example, OnePlus has and continues to directly infringe at least claim 1 of the '843 Patent by making, using, offering to sell, selling, and/or importing into the United States products that include an apparatus comprising: an oscillator circuit configured to present an output signal having a frequency in response to (i) a reference signal, (ii) a control signal and (iii) said output signal; and a logic circuit configured to present said control signal to a phase frequency detector in response to (i) said output signal and (ii) said reference signal.

65.   For example, the Accused Products comprise an oscillator circuit configured to present an output signal having a frequency, such as a processor, a clock, and/or a phase-locked loop of an SoC.

66.   For example, the Accused Products output a frequency, such as from a processor, a clock, and/or a phase-locked loop of an SoC based on a reference signal (*e.g.,* a reference clock), a control signal (*e.g.,* a watchdog signal), and said output signal.

67.   For example, the Accused Products further comprise a logic circuit, such as a logic circuit of a phase locked loop, configured to present a watchdog signal to a phase frequency detector in response to an output signal and reference signal, such as when a difference between the output signal and reference signal exceeds a parameter.

68.   M-Red has suffered damages as a result of OnePlus's direct infringement of the '843 Patent in an amount to be proved at trial.

COUNT V
(Infringement of the '171 Patent)

69.   Paragraphs 1 through 24 are incorporated by reference as if fully set forth herein.

70.   M-Red has not licensed or otherwise authorized OnePlus to make, use, offer for sale, sell, or import any products that embody the inventions of the '171 Patent.

71.   OnePlus has and continues to directly infringe the '171 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, by making, using, offering to sell, selling, and/or importing into the United States products that satisfy each and every limitation of one or more claims of the '171 Patent. Upon information and belief, these products include at least the OnePlus Accused Products incorporating Qualcomm SoCs, such as at least the OnePlus 6 incorporating the Exemplary Qualcomm SoCs.

72.   For example, OnePlus has and continues to directly infringe at least claim 1 of the '171 Patent by making, using, offering to sell, selling, and/or importing into the United States products that include a circuit comprising: an oscillator circuit having (i) first, second and third input terminals and (ii) an output terminal coupled to the second input terminal; and a logic circuit configured to present a control signal to a phase frequency detector, the logic circuit having (i) input terminals coupled to the first and second input terminals of said oscillator circuit, respectively, (ii) a counter circuit coupled to the first and second input terminals of said oscillator circuit input terminals, and (iii) a first decoder circuit coupled to the counter circuit through a first plurality of terminals and having a first output terminal coupled to the third input terminal of said oscillator circuit.

73.   For example, upon information and belief, the Accused Products comprise an SoC with a processor, PLL, and/or clock that comprises a first, second, and third input terminal, such as input terminals of a phase frequency detector, logic trap, and/or a divider.

74.   For example, upon information and belief, the Accused Products comprise an SoC with an output terminal coupled to the first and second input terminals, such as a frequency output (*e.g.* VCO_OUT), coupled to a plurality of divider and/or phase frequency detector inputs.

75.   For example, upon information and belief, the Accused Products comprise an SoC with a logic circuit (*e.g.* a watchdog circuit) configured to present a control signal (*e.g.* a reset signal) to a phase frequency detector. Upon information and belief, the watchdog circuit has input terminals coupled to the first and second input terminals of the oscillator circuit (*e.g.* clock, PLL, and/or processor), such as the divider and phase frequency detector circuits of the oscillator circuit.

76.   For example, upon information and belief, the watchdog circuit of the Accused Products further comprises a counter coupled to the first and second input terminals of the oscillator circuit, and a decoder circuit coupled to the counter circuit having a first output terminal coupled to the third input terminal of said oscillator circuit.

77.   For example, the Accused Products comprise an oscillator circuit configured to present an output signal having a frequency, such as a processor, a clock, and/or a phase-locked loop of an SoC.

78.   For example, the Accused Products output a frequency, such as from a processor, a clock, and/or a phase-locked loop of an SoC based on a reference signal (*e.g.*, a reference clock), a control signal (*e.g.*, a watchdog signal), and said output signal.

79.   For example, The Accused Products further comprise a logic circuit, such as a logic circuit of a phase locked loop, configured to present a watchdog signal to a phase frequency detector in response to an output signal and reference signal, such as when a difference between the output signal and reference signal exceeds a parameter.

80.   M-Red has suffered damages as a result of OnePlus's direct infringement of the '171 Patent in an amount to be proved at trial.

DEMAND FOR JURY TRIAL

Plaintiff hereby demands a jury for all issues so triable.

PRAYER FOR RELIEF

WHEREFORE, M-Red prays for relief against OnePlus as follows:

a.   Entry of judgment declaring that OnePlus has directly and/or indirectly infringed one or more claims of each of the Patents-in-Suit;

b.   Entry of judgment declaring that OnePlus's infringement of the Patents-in-Suit is willful;

c.   An order awarding damages sufficient to compensate M-Red for OnePlus's infringement of the Patents-in-Suit, but in no event less than a reasonable royalty, including supplemental damages post-verdict, together with pre-judgment and post-judgment interest, and costs;

d.   Enhanced damages pursuant to 35 U.S.C. § 284;

e.   Entry of judgment declaring that this case is exceptional and awarding M-Red its costs and reasonable attorney fees under 35 U.S.C. § 285;

f.   An accounting for acts of infringement;

g.   Such other equitable relief which may be requested and to which the Plaintiff is entitled; and

i.   Such other and further relief as the Court deems just and proper.

Dated: August 3, 2021   Respectfully submitted,

                                                          /s/ Alfred R. Fabricant
                                                         Alfred R. Fabricant
                                                         NY Bar No. 2219392
                                                         Email: ffabricant@fabricantllp.com
                                                         Peter Lambrianakos
                                                         NY Bar No. 2894392
                                                         Email: plambrianakos@fabricantllp.com
                                                         Vincent J. Rubino, III
                                                         NY Bar No. 4557435
                                                         Email: vrubino@fabricantllp.com
                                                         FABRICANT LLP
                                                         411 Theodore Fremd Avenue,
                                                          Suite 206 South
                                                         Rye, New York 10580
                                                         Telephone: (212) 257-5797
                                                         Facsimile: (212) 257-5796

                                                         Justin Kurt Truelove
                                                         Texas Bar No. 24013653
                                                         Email: kurt@truelovelawfirm.com
                                                         TRUELOVE LAW FIRM, PLLC
                                                         100 West Houston Street
                                                         Marshall, Texas 75670
                                                         Telephone: (903) 938-8321
                                                         Facsimile: (903) 215-8510

                                                         ATTORNEYS FOR PLAINTIFF
                                                          M-RED INC.