

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.; AND
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioner

v.

Polaris PowerLED Technologies, LLC
Patent Owner.

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 8,740,456**

TABLE OF CONTENTS

	Page
I. INTRODUCTION	1
II. MANDATORY NOTICES UNDER 37 C.F.R. §42.8.....	2
III. FEE AUTHORIZATION	3
IV. GROUNDS FOR STANDING.....	3
V. PRECISE RELIEF REQUESTED	3
VI. THE CHALLENGED PATENT	4
VII. PATENT PROSECUTION HISTORY	7
VIII. LEVEL OF ORDINARY SKILL IN THE ART.....	8
IX. PRIORITY DATE	8
X. CLAIM CONSTRUCTION	9
XI. BRIEF DESCRIPTION OF THE APPLIED PRIOR ART REFERENCES	9
A. Rabu (Ex-1005)	9
B. Katayama (Ex-1007)	11
C. Shoji (Ex-1006)	13
D. Karam (Ex-1008).....	14
XII. DETAILED EXPLANATION OF THE UNPATENTABILITY GROUNDS	16
A. Ground 1: Claims 1, 5-9, 12, and 13 Are Rendered Obvious by Rabu, Ex-1005, in View of Katayama, Ex-1007	17
1. A POSITA Would Have Been Motivated to Combine the Teachings of Rabu and Katayama, and Would Have Had a Reasonable Expectation of Success in Doing So.....	17
2. Independent Claim 1	22
3. Independent Claim 9	38
4. Dependent Claims 5-8, 12, and 13.....	46

TABLE OF CONTENTS
(continued)

	Page
B. Ground 2: Claims 1, 5-9, 12, and 13 Are Rendered Obvious by Rabu-Katayama and Further in View of Shoji, Ex-1006.....	50
1. A POSITA Would Have Been Motivated to Combine the Teachings of Rabu-Katayama, and Shoji, and Would Have Had a Reasonable Expectation of Success in Doing So.....	50
2. Independent Claim 1	52
3. Independent Claim 9	55
C. Ground 3: Claims 1-13 Are Rendered Obvious by Rabu-Katayama, and Further in View of Karam, Ex-1008	59
1. A POSITA Would Have Been Motivated to Combine the Teachings of Rabu Katayama, and Karam, and Would Have Had a Reasonable Expectation of Success in Doing So.....	59
2. Independent Claim 1	61
3. Independent Claim 9	64
4. Dependent Claims 2-8 and 10-13	67
XIII. THE BOARD SHOULD NOT USE ITS DISCRETION TO DENY INSTITUTION UNDER <i>FINTIV</i>	75
XIV. CONCLUSION.....	79

LIST OF EXHIBITS¹

Ex-1001	U.S. Patent No. 8,740,456
Ex-1002	Declaration of Dr. Hatalis
Ex-1003	Curriculum Vitae of Dr. Hatalis
Ex-1004	Prosecution History of U.S. Patent No. 8,740,456
Ex-1005	U.S. Pub. No. 2010/0315752 to Rabu et al (“Rabu”)
Ex-1006	United Kingdom Published Patent Application 2,276,783 to Shoji (“Shoji”)
Ex-1007	Japanese Published Patent Application 2011-15581 to Katayama, with certified translation (“Katayama”)
Ex-1008	U.S. Patent No. 7,593,747 to Karam et al (“Karam”)
Ex-1009	INTENTIONALLY LEFT BLANK
Ex-1010	INTENTIONALLY LEFT BLANK
Ex-1011	INTENTIONALLY LEFT BLANK
Ex-1012	INTENTIONALLY LEFT BLANK
Ex-1013	INTENTIONALLY LEFT BLANK
Ex-1014	INTENTIONALLY LEFT BLANK
Ex-1015	INTENTIONALLY LEFT BLANK
Ex-1016	INTENTIONALLY LEFT BLANK
Ex-1017	INTENTIONALLY LEFT BLANK
Ex-1018	INTENTIONALLY LEFT BLANK

¹ Four-digit pin citations that begin with 0 are to the page stamps added by Samsung in the bottom right corner of the exhibits. All other pin citations are to original page, column, paragraph, and/or line numbers.

Ex-1019	INTENTIONALLY LEFT BLANK
Ex-1020	Claim Mapping Table
Ex-1021	INTENTIONALLY LEFT BLANK
Ex-1022	Milton Ohring, <i>Reliability and Failure of Electronic Materials and Devices</i> (Academic Press) (1998)
Ex-1023	Daniel Minzari, <i>Investigation of Electronic Corrosion Mechanisms</i> (2010) (Technical University of Denmark)
Ex-1024	J. Starlet Vimala, M. Natesan & Susai Rajendran, <i>Corrosion and Protection of Electronic Components in Different Environmental Conditions - An Overview</i> , 2 Open Corrosion J. 105 (2009)
Ex-1025	U.S. Pat. No. 7,408,132 to Wambsganss et al (“Wambsganss”)
Ex-1026	U.S. Pub. No. 2002/0064008 to Hennig et al (“Hennig”)
Ex-1027	U.S. Pat. No. 6,222,716 to Chiang et al (“Chiang”)

I. INTRODUCTION

Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (collectively, “Petitioner”) request inter partes review (“IPR”) of Claims 1-13 of U.S. Patent No. 8,740,456 (“the ’456 Patent”) (Ex-1001), currently assigned to Polaris PowerLED Technologies, LLC (“Patent Owner”).

The ’456 Patent relates to adjusting current based on a change in temperature. Ex-1001, Abstract. Specifically, the ’456 “relates to the field of connections, and more particularly to a method for adjusting delivery of current in a connection based on temperature.” Ex-1001, 1:6-8.

The prior art in this Petition demonstrates that Claims 1-13 of the ’456 Patent involved well-known hardware and software components and predictable design choices in the art. This prior art also shows that a POSITA would have been motivated to use these components to address well-known issues relating to current delivery over a connection. Thus, Claims 1-13 of the ’456 Patent would have been obvious over the prior art.

This Petition presents non-cumulative grounds of unpatentability not addressed during patent prosecution. The grounds presented in this Petition are more than reasonably likely to prevail, this Petition should be granted, a trial should be instituted, and the challenged claims should be cancelled.

II. MANDATORY NOTICES UNDER 37 C.F.R. §42.8

Real Parties-in-Interest: Petitioner identifies the following real parties-in-interest: Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc.

Related Matters: Patent Owner has asserted the '456 Patent against Petitioner in *Polaris PowerLED Techs., LLC v. Samsung Elecs. Am., Inc.*, No. 2:22-cv-00469 (E.D. Tex. filed Dec. 12, 2022).

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Los Angeles CA, with courtesy copies to the email address identified above.

III. FEE AUTHORIZATION

Pursuant to 37 C.F.R. §42.15(a) and §42.103(a), the PTO is authorized to charge any and all fees to Deposit Account No. LA500639.

IV. GROUNDS FOR STANDING

Petitioner certifies that the '456 Patent is available for IPR, this Petition is timely filed, and Petitioner is not barred or estopped from requesting IPR on the grounds presented.

V. PRECISE RELIEF REQUESTED

Petitioner requests cancellation of Claims 1-13 of the '456 Patent under 35 U.S.C. § 103 on the following grounds:

- **Ground 1:** Claims 1, 5-9, 12 and 13 are rendered obvious by U.S. Patent Publication No. 2010/0315752 to Rabu et al (“Rabu”) (Ex-1005) in view of Japanese Published Patent Application 2011-15581 to Katayama, with certified translation (“Katayama”) (Ex-1007).
- **Ground 2:** Claims 1, 5-9, 12 and 13 are rendered obvious by Rabu-Katayama in further view of UK Published Patent application 2,276,783 to Shoji (“Shoji”) (Ex-1006).
- **Ground 3:** Claims 1-13 are rendered obvious by Rabu-Katayama, and further in view of U.S. Patent No. 7,593,747 to Karam et al (“Karam”) (Ex-

1008).

The following table is a summary of the above enumerated grounds:

Ground	Prior Art	Claims
1	Rabu and Katayama	1, 5-9, 12, and 13
2	Rabu, Katayama, and Shoji	1, 5-9, 12, and 13
3	Rabu, Katayama, and Karam	1-13

The Petition discusses rationales for each of the above enumerated grounds and is supported by a declaration from Dr. Hatalis. Ex-1002.

VI. THE CHALLENGED PATENT

The alleged invention of the '456 Patent relates to adjusting delivery of current in a connection from one device to another and based on temperature. Ex-1001, Abstract, 1:6-8, 1:34-36. It purports to have invented; (i) measuring a change in temperature of a connection between a first device and a second device, while the first device provides current to the second device; (ii) if the change in temperature is above a threshold, reducing the current being provided from the first device to the second device; and (iii) the change in temperature may be determined at the first device and/or the second device, for example, by measuring the temperature of a connector of the connection. *Id.*, Abstract.

The '456 Patent relates to a “system configured to modify current (or power) delivered [] between a first device 100 and a second device 150.” Ex-1001, 3:46-47. The first device may be any of numerous devices (e.g., mobile/portable devices) that receives power from another device or power source, and the second device may be any of various devices (e.g., a computer system) that provide power to the first device. *Id.* at 4:24-41.² A connection couples the first device and the second device. *Id.* at 5:15-17. Indeed, in Figures 1A and 2A,³ “[i]n one embodiment, the electrical assemblies 202 and 210 may be ports (or connectors) of the first device [] and second device []” so as to connect “both the first device [] and the second device [] via the corresponding connectors [(i.e., connectors 204 and 208)] of the connection and the electrical assembly of the respective device.” *Id.* at 5:22-27.

² The labels “first device” and “second device” as used in the specification are transposed compared to their use in the claims, but this is a difference of form, not substance. For all independent and dependent claims, the “first device” refers to the device that provides current, while the “second device” refers to the device that receives current. *See id.*, independent Claim 1 (10:33-34 (“while the first device provides current to the second device”); 10:39-40 (“current being provided from the first device to the second device”)); independent Claim 9 (12:2-3 (“current being provided from the first device to the second device”).

³ Throughout this Petition, all annotations and emphasis have been added, unless otherwise noted.

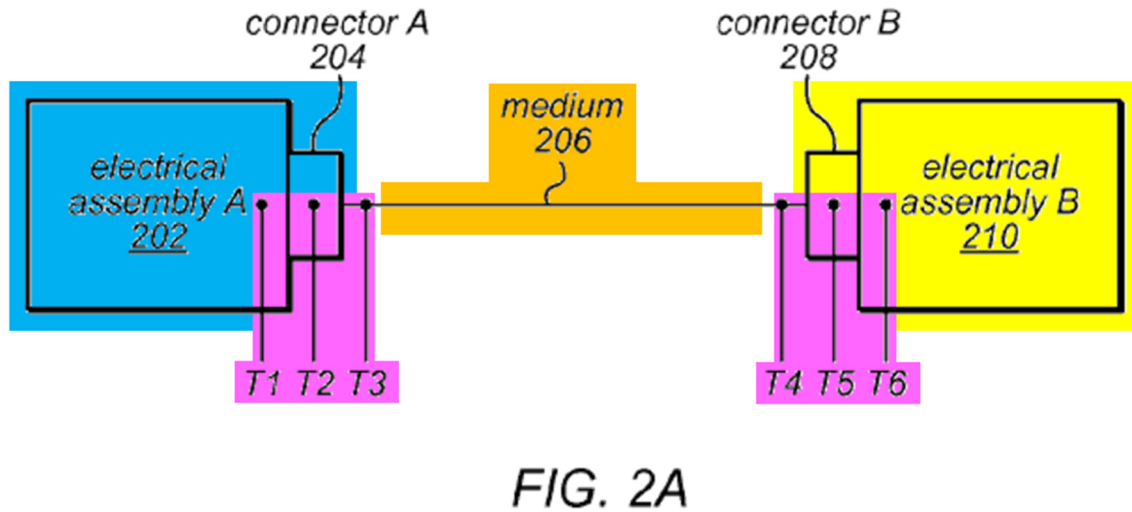
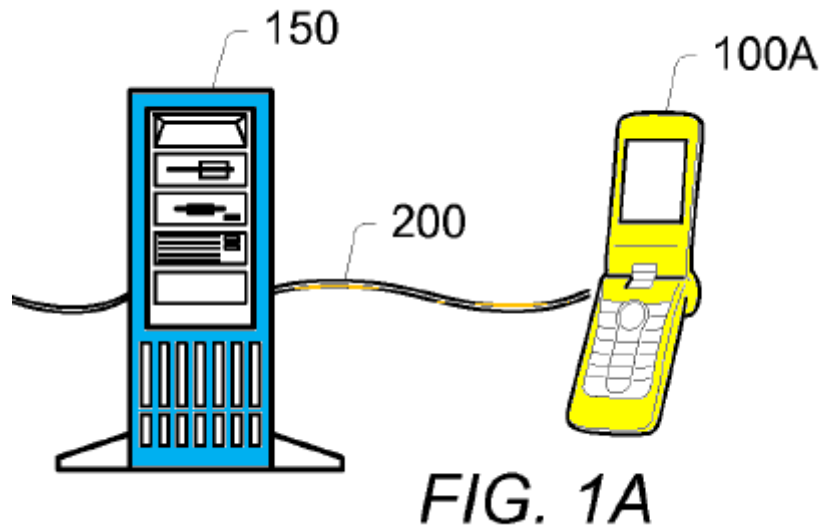


Figure 3 shows an exemplary device, either first device 100 or second device 150, with the electrical assembly connecting to several logics for certain functionalities. Ex-1001, 5:49-54. The device may include temperature logic 320, “which may be configured to compare the measured temperature [] with a threshold temperature.” *Id.* at 6:11-13. Indeed, “temperature logic 320 may indicate the threshold has been exceeded to power logic 330, which may in turn

cause a reduction in current received or provided over the connection” connecting the first device and second device. *Id.* at 6:16-19. Temperature logic 320 also may include a temperature sensor used to measure the temperature at various places, such as those shown in FIGS. 2A labeled as T1-T6. *Id.* at 6:20-22, Fig. 2A (above, pink).

As explained in detail below, the '456 Patent claims are obvious in view of the prior art.

VII. PATENT PROSECUTION HISTORY

The '456 Patent's file history is submitted as Ex-1004. The '456 Patent issued from application 13/109,446, filed on May 17, 2011. Ex-1002 ¶35.

On August 19, 2013, the Office rejected Claims 1-7, 10-15 under 35 U.S.C. § 102 as anticipated by each of several prior art references. Ex-1004, 74-78. In response, on December 2, 2013, Applicants submitted amended claims and remarks distinguishing the cited prior art. *Id.* at 100-10. Significantly, Applicants emphasized that the amended claims measure temperature at two locations: “The amended Claims recite the measurement of temperature changes ***at both ends of the electrical connection*** between the first device and the second device.” *Id.* at 107. Applicants further emphasized comparing temperature change measurements: “the current is of the electrical connection is adjusted based ***on the greater of the temperature change measurements*** made at the first and second devices.” *Id.*

In remarks, Applicants distinguished the cited prior art as not disclosing temperature sensors at both ends of an electrical connection or at both devices, and as not measuring temperature changes. Ex-1004, 107-09. For example, applicants acknowledged that prior art reference Reusche discloses multiple sensors included in the outlet, but distinguished Reusche “because they would all be on the same side of the electrical connection, rather than having sensors measuring temperature changes on both sides of the electrical connection.” *Id.*

The Office allowed the claims and on June 3, 2014, and issued the application as U.S. Patent No. 8,740,456. Ex-1004, 150.

VIII. LEVEL OF ORDINARY SKILL IN THE ART

One of ordinary skill in the art would have had a bachelor’s degree in electrical engineering, computer engineering, materials science, or a related field, and at least two years of experience in the research, design, development, and/or testing of computer circuitry, wired connections, temperature sensors, power charging, and related firmware and software, or the equivalent, with additional education substituting for experience and vice versa. Ex-1002 ¶¶40-54.

IX. PRIORITY DATE

The earliest possible priority for the ’456 Patent is May 17, 2011. Petitioner takes no position on the proper priority date for each claim of the ’456 Patent.

Assuming this earliest date, all prior art references asserted in this petition are prior art.⁴

X. CLAIM CONSTRUCTION

Petitioner interprets the claims of the '833 Patent according to 37 C.F.R. § 42.100(b). To resolve the particular grounds presented in this Petition, Petitioner does not believe that any term requires explicit construction. Ex-1002 ¶56.⁵

XI. BRIEF DESCRIPTION OF THE APPLIED PRIOR ART REFERENCES

A. Rabu (Ex-1005)

Rabu, titled “Thermal Protection Circuits and Structures for Electronic Devices and Cables,” is U.S. Pub. No. 2010/0315752, published Dec. 16, 2010. Rabu is §102(a) prior art and §102(e) prior art. Ex-1002 ¶57.

In Figure 1, Rabu discloses electronic device 12 and electronic device 14 coupled by path 16. Ex-1005, Fig. 1. Rabu explains that “[a] wired path such as path 16 may be used to connect electronic device 12 to electronic device 14.” *Id.*

⁴ Petitioner reserves the right to challenge the priority date in this or other proceedings to the extent PO attempts to swear behind the prior art relied upon in this Petition.

⁵ Claim construction procedures have not yet begun in the related district court matter. Petitioner reserves the right to revisit and revise these constructions in district court as necessary. Additionally, Petitioner will request leave to submit any claim construction order as soon as it becomes available, so that it is timely made of record in the proceeding and can be considered by the Board. 37 C.F.R. § 42.100(b).

¶34. Rabu discloses that “path 16 includes one or more conductive lines and a connector at each end.” *Id.* “The conductive lines in path 16 may be used to convey signals such as data and power signals over path 16.” *Id.*

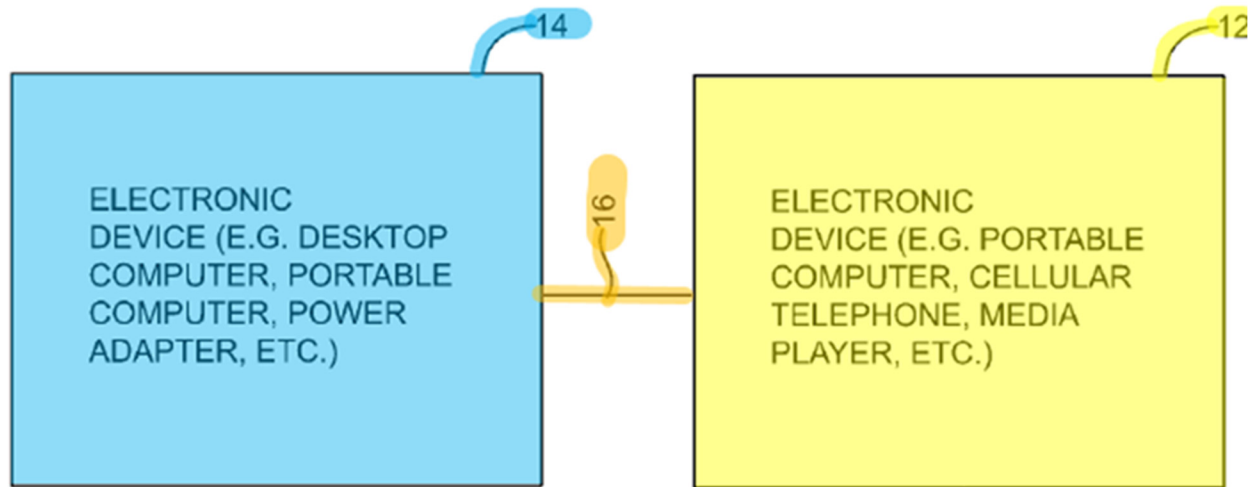


FIG. 1 (rotated)

In Figure 15, Rabu discloses “temperature sensor 1500 in electronic device 12” and further states that temperature sensor 1500 “may be able to sense the temperature of connector 38 of cable 16 and convey signals to cutoff switch 1502 representative of the temperature of connector 38.” Ex-1005 ¶77. This occurs when “the temperature of the first connector has exceeded a threshold temperature.” *Id.* ¶8.

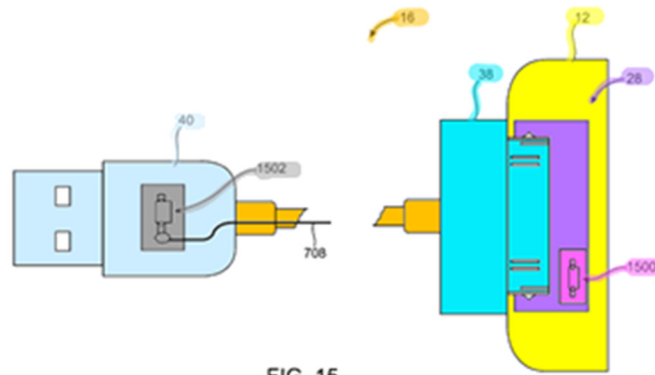


FIG. 15

Moreover, Rabu explains that a temperature sensor may be provided at both ends of the connection, in both device 14 and device 12. Specifically, “[t]hermal protection circuitry 710 may include a temperature-sensitive device such as a temperature sensor” and “thermal protection circuitry may be provided in electronic device 12 and in electronic device 14.” Ex-1005 ¶¶46, 78.

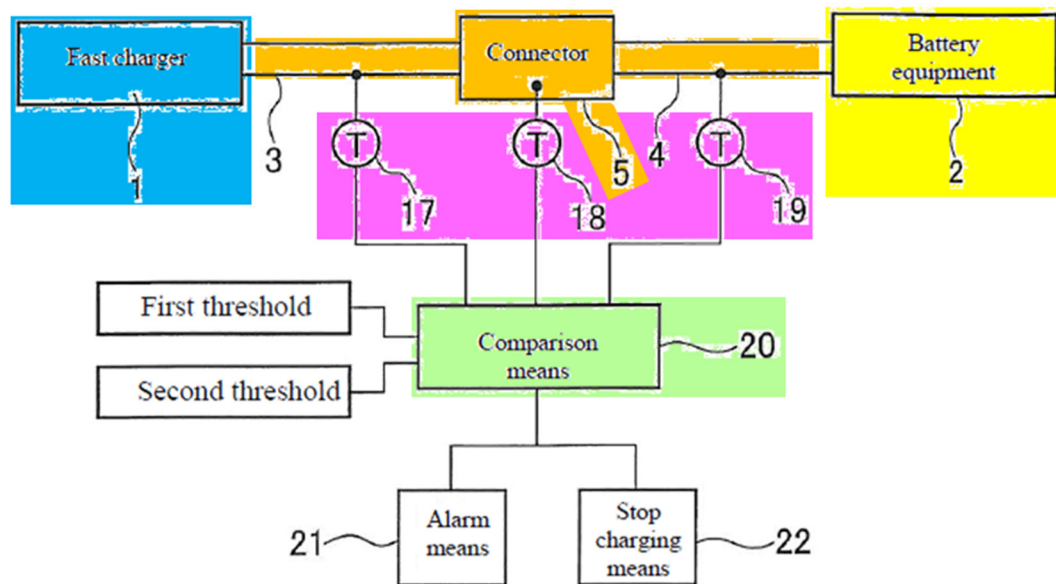
B. Katayama (Ex-1007)

Katayama, titled “Deterioration Detection Device For Electric Vehicle Fast Charger,” is Japanese Published Patent Application 2011-15581, published on January 20, 2011. Katayama is §102(a) prior art. Ex-1002 ¶61. A certified translation is included in Ex-1007. Citations are made to the translated document.

Katayama discloses a deterioration detection device for electric vehicle fast charger that stops charging when a temperature difference is at or above a certain threshold value. Ex-1007 ¶1. The charging device includes multiple temperature sensors for measuring temperature at different locations and connects to a battery equipment via a connector. *Id.*, Abstract.

In Figure 3, Katayama discloses fast charger (1) connected to battery equipment (2) installed on an electric vehicle via connector (5). Ex-1007 ¶14, Abstract. Fast charger (1) connects to connector (5) via charging cable (3), and connector (5) connects to battery equipment (2) via charging cable (4). *Id.*

FIG. 3



In Figure 3, Katayama teaches temperature sensors and a means for stopping charging when any of the measured temperatures is at or above a certain threshold value. Ex-1007 ¶18. Charging cable (3), connector (5), and charging cable (4) each is equipped with temperature sensor (17, 18, and 19), respectively. *Id.* A first threshold value is defined as the value by which the measured temperature of temperature sensors (17, 18, and 19) that is greater than the normal value. *Id.* And a second threshold value is defined as the temperature at which charging cable 3 or

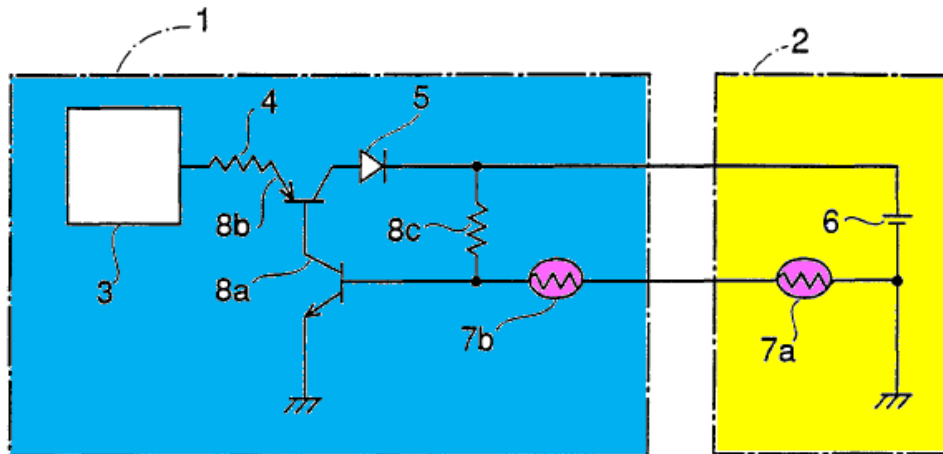
4 or connector 5 may burn out. *Id.* Comparison means 20 is provided to compare the measured temperature of any one of temperature sensors (17, 18, or 19) to a first or second threshold value. *Id.* Means (21) is provided for sounding a minor alarm, and means (22) is provided for stopping charging. *Id.*

C. Shoji (Ex-1006)

Shoji, titled “Battery Charging Apparatus,” is United Kingdom Published Patent Application 2,276,783, published on October 10, 1994. Shoji is §102(b) prior art. Ex-1002 ¶65.

Shoji discloses a charging device to supply power to a battery of a separate portable device. Ex-1006, Abstract. Shoji also teaches that a temperature sensor should be located both in the charger and in the device being charged. This is shown, for example, in Shoji’s Figure 3. Charger 1 (blue) includes thermistor 7b (pink). *Id.* at 10, 13. The charger is connected to battery-operated device 2 (yellow), which includes thermistor 7a (pink). *Id.* Additionally, Charger 1 and Device 2 are removably connected via a “three-terminal” or “two-terminal” connector. *Id.* at 15. Shoji teaches to stop charging if the temperature of either device is too high. *Id.*, Abstract.

Fig.3



D. Karam (Ex-1008)

Karam, titled “Techniques for Controlling Delivery of Power to a Remotely Powerable Device Based on Temperature,” is U.S. Patent No. 7,593,747, issued on Sept. 22, 2009. Karam is §102(b) prior art.

Karam discloses an improved method for delivering power to a remotely powerable device. Ex-1008, Abstract. The method involves comparing an operating resistance to an initial resistance to generate a temperature change result, and selectively changing the delivery of power to the remotely powerable device based on the temperature change result. *Id.*

In Figure 1, Karam discloses “layout 20 for a Power-over-Ethernet (PoE) system 22” which “includes power-sourcing equipment (PSE) 24, a remotely

powerable device (PD) 26, and a communications pathway 28.” Ex-1008, 3:38-39, 3:41-43.

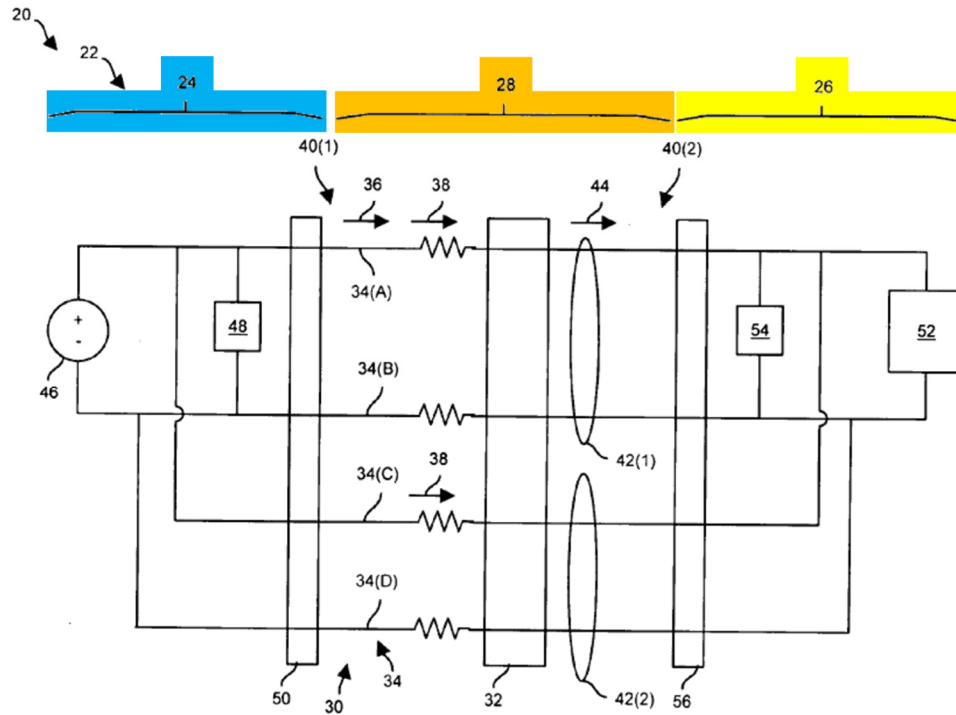


FIG. 1

In Figure 3, PSE 24 includes local voltage monitor 80, local current monitor 82, analog to digital converter (ADC) 84, receiver 86, controller 88, and non-volatile memory 85. Ex-1008, 6:4-7. “Controller 88 includes a processor 98 and memory 100 which stores a specialized application 102” and when the application is executed, “processor 98 calculates the resistance ‘R’ through the communications pathway 28.” *Id.* at 7:23-27. “Accordingly, the controller 88 computes the resistance ‘R’ through the communications pathway 28 at different times in order to determine a temperature change.” *Id.* at 7:28-30. Karam discloses

that “controller 88 periodically generates a temperature change result [] and compares this temperature change result [] to a predetermined threshold value [].” *Id.* at 8:22-25. Based on the temperature change result, processor 98 then either enables or disables power delivery to PD 26. *Id.* at 9:26-29.

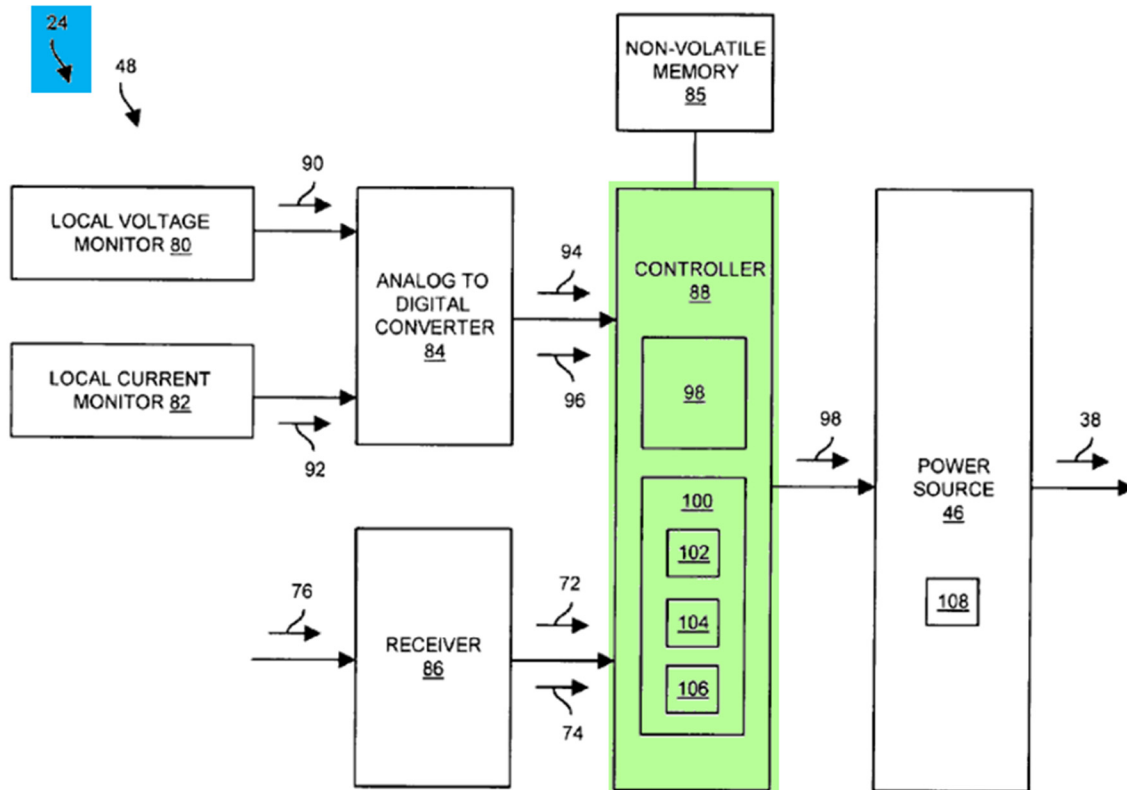


FIG. 3

XII. DETAILED EXPLANATION OF THE UNPATENTABILITY GROUNDS

The '456 Patent contains 13 claims, two of which are independent. Claims 1 and 9 are similar, with a few minor variations in some of the elements. Exhibit 1020 is a summary table showing correspondence between challenged claims and

elements. As explained below, the challenged claims are disclosed and/or taught by the prior art.

A. Ground 1: Claims 1, 5-9, 12, and 13 Are Rendered Obvious by Rabu, Ex-1005, in View of Katayama, Ex-1007

1. A POSITA Would Have Been Motivated to Combine the Teachings of Rabu and Katayama, and Would Have Had a Reasonable Expectation of Success in Doing So

In addition to the reasons set out below with respect to specific claim elements, a POSITA would have been motivated to combine the teachings of Rabu and Katayama, and would have a reasonable expectation of success in doing so, at least because each relates to predictable ways of safely charging electronic devices using thermal protection of circuits. Ex-1002 ¶¶72-80.

Rabu relates to thermal protection of circuit connections using temperature sensors. Ex-1005 ¶¶3-5. For example, cables and their connectors inadvertently exposed to moisture can lead to dendrite growth,⁶ which in turn can cause damaging short circuits. *Id.* ¶30. If repeatedly exposed to moisture, “dendrites will eventually grow sufficiently to form a high-current path between the conductive portions of the connector (i.e., conductors at different potentials),” which will cause heating that “will sometimes be sufficient to burn plastic housing structures

⁶ Dendrites are formed by the small conductive deposits that are pulled across the insulating dielectrics and deposited by moisture in the presence of voltage differences. Ex-1005 ¶42.

in the connector.” *Id.* Rabu teaches locating temperature sensors and power cutoff switches in connectors or in the connected electronic devices and measuring temperature at those locations. *Id.* ¶¶7-8, 10; Ex-1002 ¶73. For example, Rabu teaches that temperature protection circuits, including temperature sensors, may be included in both the portable computer 14 and the device 12 being charged. Ex-1005 ¶46 (“[t]hermal protection circuitry 710 may include a temperature-sensitive device such as a temperature sensor”), ¶78 (“thermal protection circuitry may be provided in electronic device 12 **and** in electronic device 14”), ¶82 (temperature sensor “to monitor temperature in one of the connectors of cable 16”).

Like Rabu, Katayama also relates to a charging device using temperature sensors to measure temperature at different locations in the circuit, so as to stop charging and prevent burnout of charging cables and devices. Ex-1007 ¶¶5, 18. Specifically, Katayama teaches stopping the current when any of multiple measured temperatures is above a certain threshold value that may cause “burn out.” *Id.* ¶18.

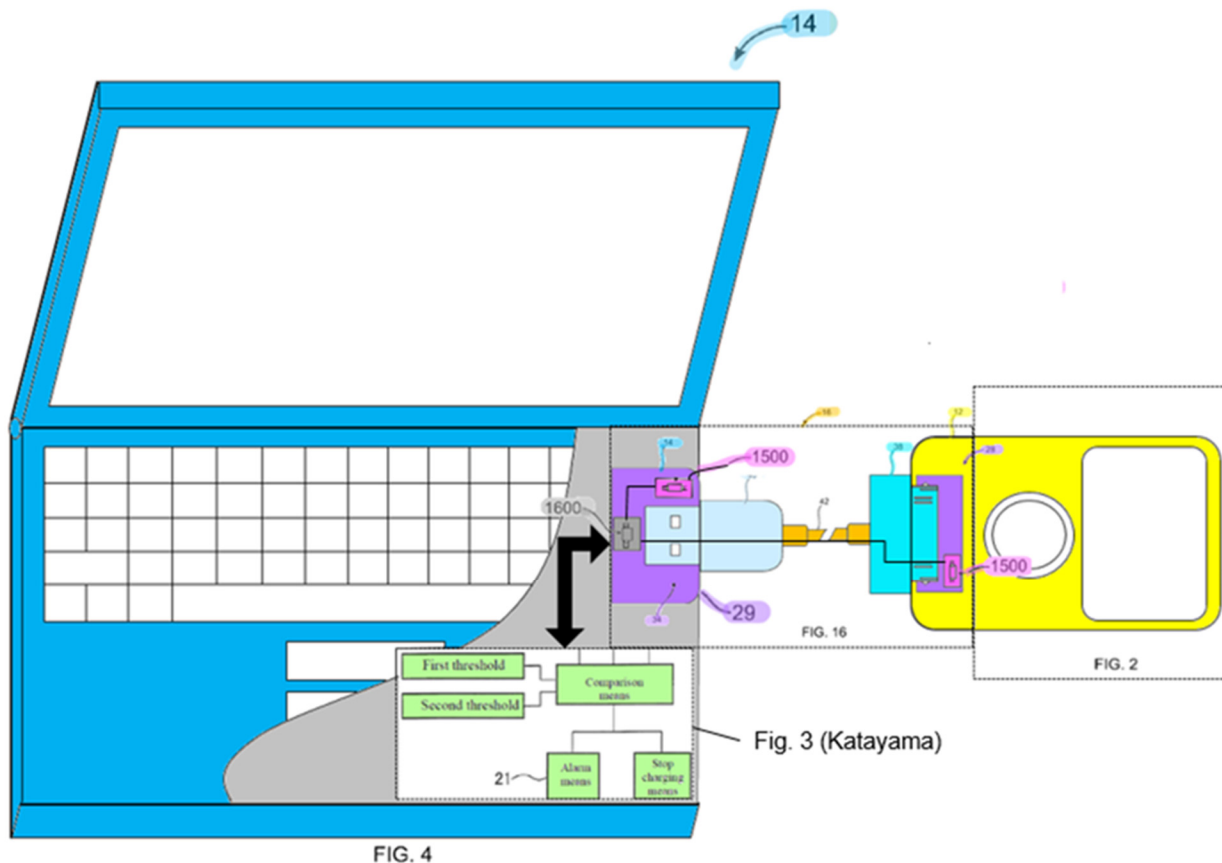
In view of these related teachings, a POSITA would have been motivated to combine the teachings of Rabu and Katayama. A POSITA would have been motivated to combine these interrelated teachings because the end result would be a better design for preventing overheating and damage caused by electrical shorts. Ex-1002 ¶77. As Rabu explains, thermal protection circuits are beneficial for

limiting the damage caused by moisture-induced dendrite growth and resulting short circuits by cutting the current. Ex-1005 ¶¶31, 32. Rabu also recognizes that such dendrite-induced shorts could occur at either or both ends of a connection. *Id.* ¶86 (dendritic shorts may form “in cable 16 or [] connectors 38 and 40” at either end of the cable). Similarly, Katayama explicitly explains the benefit of using thermal protection circuits in both the device providing power and the device receiving power to measure temperature at these locations. Ex-1007 ¶¶18, 12 (preventing “the degradation of the charging cable or connector from the fast charger to the battery” and “enabling reliable and accurate detection”), Fig. 3. As such, in the combined Rabu-Katayama system, a POSITA would have been motivated to achieve the most complete possible thermal and power control using the benefits taught by each reference because such a system would operate more efficiently and with less risk of catastrophic failure to the devices attached at both ends of the connection. Ex-1002 ¶77.

A POSITA would have a reasonable expectation of success in combining the teachings of Rabu and Katayama, at least because each teaches similar and routine structures and components for charging electronic devices. For example, Rabu teaches a portable computer connected to a battery-powered device being charged. Ex-1005, Fig. 1. Rabu further teaches incorporating temperature sensors in the charging circuit. Ex-1002 ¶¶50, 54, 77, Figs. 9, 15, 16. Like Rabu, Katayama

teaches a charger connected via wires and connectors to a device with a rechargeable battery. Ex-1007 ¶14. And further like Rabu, Katayama teaches equipping these devices with temperature sensors. *Id.* ¶14.

A POSITA would have reasonably expected success in combining those teachings into one system because it was well known in the art that analog components can be adapted for connection with digital components, and vice versa, as well as that hardware components may be converted into software components, and vice versa, to construct an operable system. Ex-1002 ¶79. For example, a combined system could take the below form:



Rabu's cable 16 (orange) would attach portable computer 14 (blue) to mobile device 12 (yellow). Ex-1005 ¶¶36-40. As explained in Rabu's Figure 16, thermal sensor 1500 (pink) is located in port 28 of device 12, where it measures the temperature of port 28. *Id.* ¶¶77, 78. A comparable temperature sensor would have been included in portable computer 14 as well, as taught by Rabu. *Id.* ¶¶43, 46, 47, 78. Additionally, as taught by Rabu, the second thermal sensor would be included near the connector, e.g., in port 29 of portable computer 14, where it would measure the temperature of port 29. *Id.* ¶¶43, 46, 47, 78. As further explained by Rabu in connection with its Figure 16, cutoff circuitry 1600 (gray) would also be located in portable computer 14 to turn off power if either temperature sensor sensed too high of a temperature change in the ports. *Id.* ¶78. And as taught by Katayama, Rabu's cutoff circuitry 1600 would have included Katayama's temperature threshold comparison logic 20, thresholds, and "stop charging" means 22 (green) to determine when to cut off the power (power cut-off being taught by both Rabu and Katayama). Ex-1007 ¶18. A POSITA would have included Katayama's comparison of changed temperatures to each other and a threshold to cut-off or limit when the greater of the changed temperatures exceeds the threshold. Ex-1002 ¶80.

2. Independent Claim 1

a. 1[Pre] - A method for adjusting current based on temperature, comprising:

Rabu teaches the preamble of Claim 1 to the extent limiting. Ex-1002 ¶¶81-82.

Rabu teaches “thermal protection circuitry that reduces or eliminate[s] power supply signals flowing to a connector in [a] cable.” Ex-1005 ¶32. Rabu also teaches that power and current are directly related quantities: “[s]witch 900 may include a number of circuit components such as transistors, resistors, capacitors, etc. that allow switch 900 to *block power delivery* when desired (i.e., *by interrupting the flow of current*).” *Id.* ¶55. Thus “block[ing] power delivery” and “interrupting the flow of current” similarly reduce or eliminate current in a circuit. Ex-1002 ¶82 (referring to Ohm’s law). Rabu thus teaches a method for adjusting current by reducing power supply signals based on the temperature of the connector. *Id.*

b. 1[A] - determining a change temperature at a first device wherein said temperature is measured at a first port of the first device that is configured to receive a connection to a second device;

Rabu teaches the limitations of element 1[A]. Ex-1002 ¶¶83-95.

Rabu teaches “a first device,” “a second device,” and “the first device that is configured to receive a connection to a second device.” Ex-1002 ¶84. In Figure 1,

Rabu teaches two electronic devices, 12 (second device, yellow) and 14 (first device, blue),⁷ connected via path 16 (connection, orange). Ex-1005 ¶12. Wired path 16 connects electronic device 12 (e.g., a “Cellular Telephone”) to electronic device 14 (e.g., a “Portable Computer”) and may be used to convey data and/or power signals between the two devices. *Id.* ¶34.

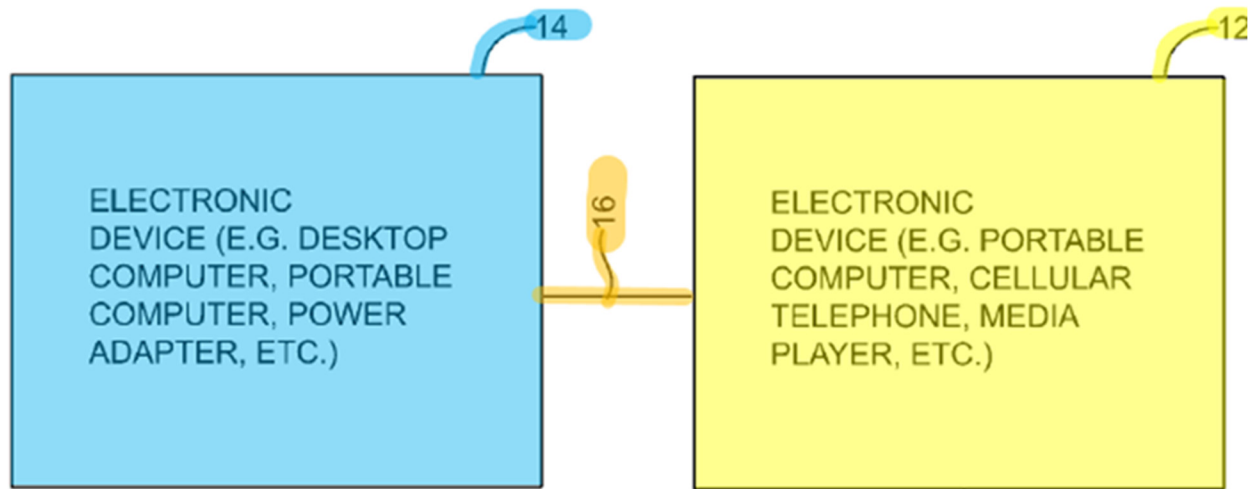
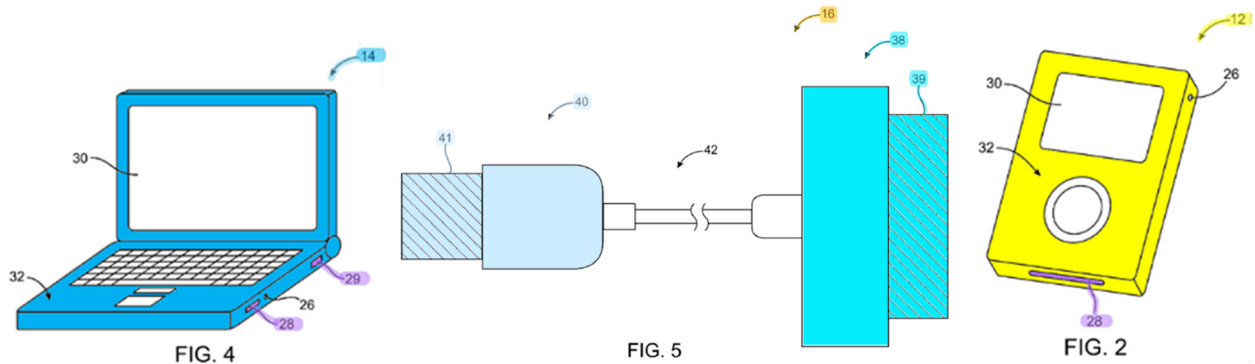


FIG. 1 (rotated)

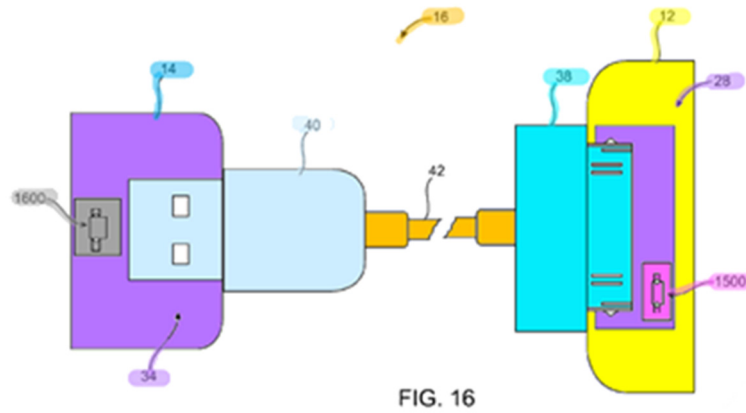
Rabu teaches that device 14 (the first device) may have connectors that couple to one or more connectors in path 16. Ex-1005 ¶¶39, 40, Fig. 4. For example, in Figure 4, Rabu discloses that “[d]evice 14 may [] have connectors such as connector 28 and connector 29,” which “may be 30-pin connectors, Universal Serial Bus (USB) ports, connectors that couple to one or more

⁷ Because claim element 1[C] requires that the “first device provides current to the second device,” Petitioner maps Rabu’s portable computer 14, or other devices 14 that provide power to the second device, to the claimed “first device.”

connectors in path 16.” *Id.* ¶¶39, 40, Fig. 4. A POSITA would have understood that connector (28, 29) of a portable computer 14 may be “a port of the first device” because connector (28, 29) expressly may be a USB port. Ex-1002 ¶85. Portable computer 14 charges device 12. Ex-1005 ¶81 (“cable 16 may convey power signals from electronic device 14 to electronic device 12 (e.g., to power electronic device 12 and/or to charge a battery in electronic device 12)”; *id.* ¶38, Fig. 3.



Rabu also explains that temperature protection circuits, including temperature sensors, may be included in either portable computer 14 (first device), device being charged 12 (second device), or both. In Figure 16, Rabu teaches placing thermal protection circuitry in device 12 and in device 14. Ex-1005 ¶78 (“thermal protection circuitry may be provided in electronic device 12 *and* in electronic device 14”). Such thermal protection circuitry “may include temperature sensor 1500 in electronic device 12 (e.g., sensor 1500 in connector 28) and a cutoff switch 1600 in electronic device 14.” *Id.*



Rabu also teaches that the thermal protection circuitry can be provided on one side of the connection. *Id.* ¶46, Fig. 7. For example, in Figure 7, “[t]hermal protection circuitry 710 may include a temperature-sensitive device such as a temperature sensor and a voltage (power) cutoff switch” together as one unit on the same side of the connection. *Id.* ¶46. Alternatively, in Figure 8, the cutoff switch and temperature sensor can be separate units on the same side of the connection. *Id.* ¶47, Fig. 8.

Rabu teaches measuring temperature at various places in the system where there exist vulnerabilities for short circuits caused by dendritic build up. Ex-1005 ¶¶46, 50, 77, 78 (sensors in connector 28 and 38), 86 (cable connectors 38 and 40). For example, a POSITA would have understood that dendritic growths and potential shorts may form near the device ports or cable connectors of both device 12 and device 14 for essentially the same reasons—both devices’ ports and cable connectors are uncovered, exposing them to ambient moisture infiltration. Ex-1002

¶88. Accordingly, a POSITA would have understood from Rabu's teachings to use a temperature sensor to measure temperature at any of many locations where a dendritic short is likely to occur, including in the port of the device providing power (14) (first device) Ex-1002 ¶¶88, 94.

Additionally, Rabu teaches "determining a change temperature."⁸ Ex-1002 ¶95. Rabu teaches that "temperature sensor 902 may be formed from a temperature-sensitive resistor such as thermistor 1016 (i.e., a resistor with a resistance that varies with temperature) coupled to power cutoff switch 900 over conductors 1008 and 1018." Ex-1005 ¶54. A POSITA would have understood that a temperature sensor and a temperature-sensitive resistor, or thermistor, is used to determine a change in temperature.⁹ Ex-1002 ¶95. For example, Rabu expressly teaches to take corrective action when "a rise in temperature is detected." Ex-1005 ¶67. This "rise in temperature" may reflect, for example, a change in temperature

⁸ To the extent that this claim element can be understood, Petitioner applies the prior art such that "determining a change temperature" means "determining a change [in] temperature" or "determining a temperature change." Petitioner's application of the prior art is the same under either of these meanings, which are stated here expressly for clarity.

⁹ Here and in all Grounds of this petition, Rabu's teachings across Figures and embodiments are cross-applicable because they comprise consistently numbered components directed to the common goal of strategically placing temperature sensors in vulnerable locations for thermal protection of circuits. Ex-1002 ¶93.

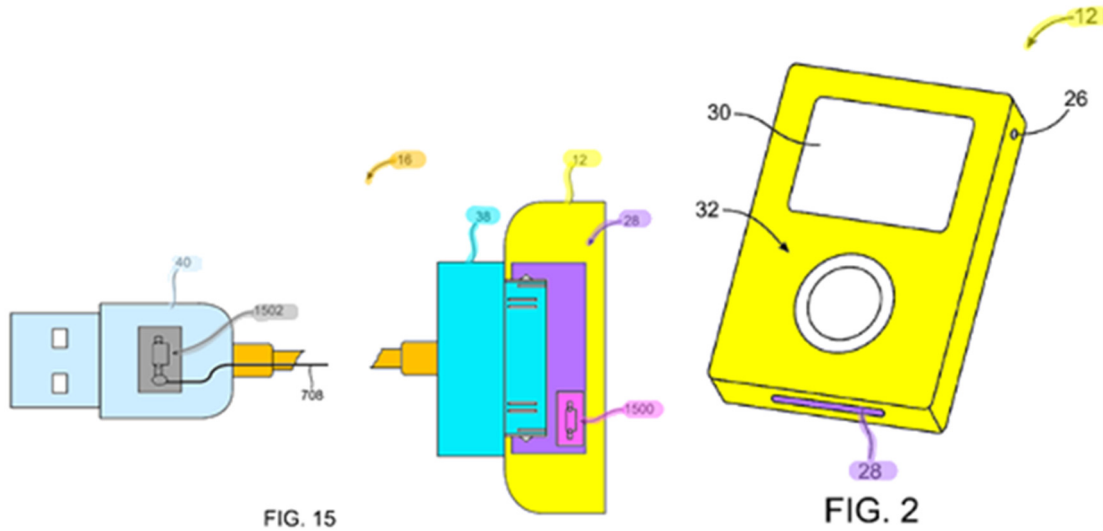
over an ambient level, or a temperature change “rising above a threshold level.” *Id.*

¶¶46, 57.

- c. **1[B] - determining a change temperature at a second device wherein said temperature is measured at a second port of the second device that is configured to receive the connection to the first device;**

Rabu teaches the limitations of element 1[B]. Ex-1002 ¶¶96-100.

As explained above for element 1[A], Rabu teaches measuring temperature at various places in the system where there exist vulnerabilities for shorts or “dendritic” build up. Ex-1005 ¶¶46, 50, 77, 78, Fig. 16. For example, shown in Figures 15, 16, and 2, Rabu teaches including a temperature sensor in the port of device 12 (the claimed second device), into which the cable connector connects. Rabu explains that “temperature sensor 1500 [is] in electronic device 12” and states that temperature sensor 1500 (pink) “may be able to sense the temperature of connector 38 of cable 16.” *Id.* ¶77. Indeed, “temperature sensor 1500 may detect the increasing temperature and direct power cutoff switch 1502 to shut off power to connector 38 (e.g., to shut off a positive power supply voltage on conductor 708).” *Id.* An “increasing temperature” being detected by Rabu in device 12 corresponds to the claimed “change temperature at a second device.”



Rabu teaches “a second port of the second device” based on its disclosures in Figures 2 and 15. Rabu teaches that “temperature sensor 1500 may be included in connector 28 of electronic device 12.” Ex-1005 ¶77, Figs 2, 15. And device 12’s “[c]onnector 28 may be a 30-pin connector, a Universal Serial Bus (USB) port, a connector that couples to a connector in path 16.” *Id.* ¶37, Fig. 2. A POSITA would have understood that connector (28) of device 12 may be “a port of the second device” because connector (28) expressly can be a USB port. Ex-1002 ¶98.

Rabu also teaches the second device “is configured to receive the connection to the first device.” Specifically, the claimed “second device” corresponds to Rabu’s device that receives power, e.g., device 12. Ex-1005 ¶¶34, 35. Additionally, connector 28 in device 12 receives the connection to the first device. *Id.* ¶40. In Figures 15 and 16, temperature sensor 1500 (pink) is in the connection port of connector 28 (purple) of device 12 (yellow). *Id.* ¶¶77, 78.

Rabu further teaches “determining a change temperature at a second device” for the same reasons discussed in Section XII.A.2.b (for element 1[A]). Ex-1002 ¶100. Rabu teaches placing a temperature sensor in a port on a device to measure temperature there, where a short and resulting heat buildup may occur. Ex-1005 ¶¶50, 77. In Figure 15, temperature sensor 1500 is located in the port of device 12, and in this way, “temperature sensor 1500 in electronic device 12 may be able to sense the temperature of connector 38 of cable 16.” *Id.* ¶77.

d. 1[C] - determining the greater of the changes in temperature measured at the first device and the second device, wherein said determining is performed while the first device provides current to the second device over the connection;

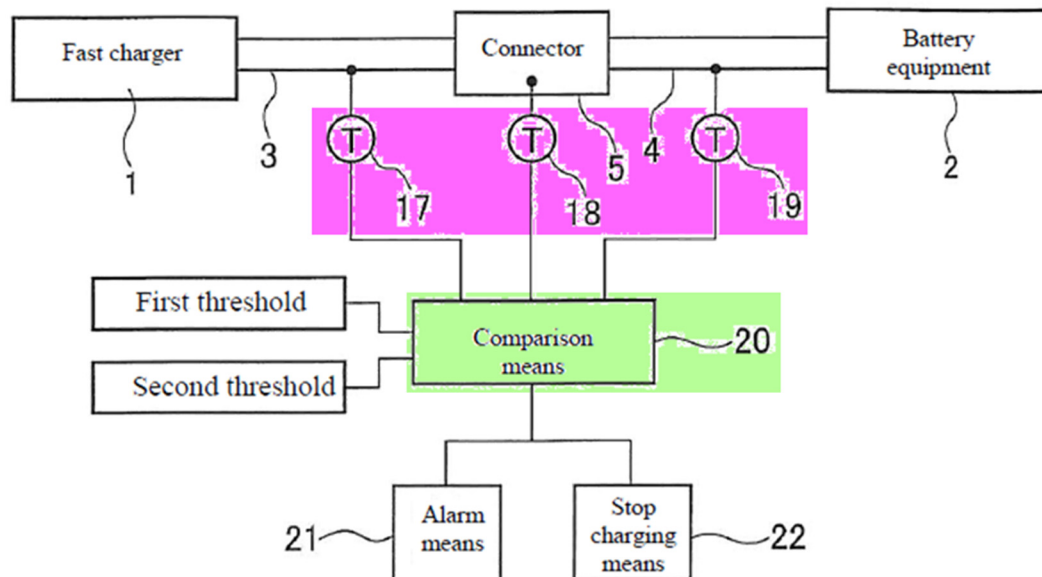
Rabu and Katayama teach the limitations of element 1[C]. Ex-1002 ¶¶101-13.

As explained in Sections XII.A.2.b-c (for elements 1[A] and 1[B]), the combined system would have temperature sensors at both ends of the connection for measuring temperature changes at both ends: both at the first device providing power (Rabu’s device 14) and at the second device receiving power (Rabu’s device 12). Both Rabu and Katayama teach that a temperature change greater than a fixed value may cause damage to the system. Ex-1005 ¶75; Ex-1007, Cl. 3. With multiple temperature change measurements taken, it would have been obvious to a POSITA to determine the worst case temperature change. That is, a POSITA

would have “determine[d] the greater of the changes in temperature measured at the first device and the second device” in the combined system because it was well known in the prior art that the greater change in temperature poses the greater risk of damage to the system. Ex-1002 ¶102.

Katayama expressly teaches measuring temperature changes in a charging system at multiple locations. Ex-1007 ¶18, Cl. 3. In Figure 3, these multiple points include: on wires (3) of fast charger 1, on wires (4) of battery-operated equipment 2, and on connector 5. Ex-1007 ¶18, Fig 3.

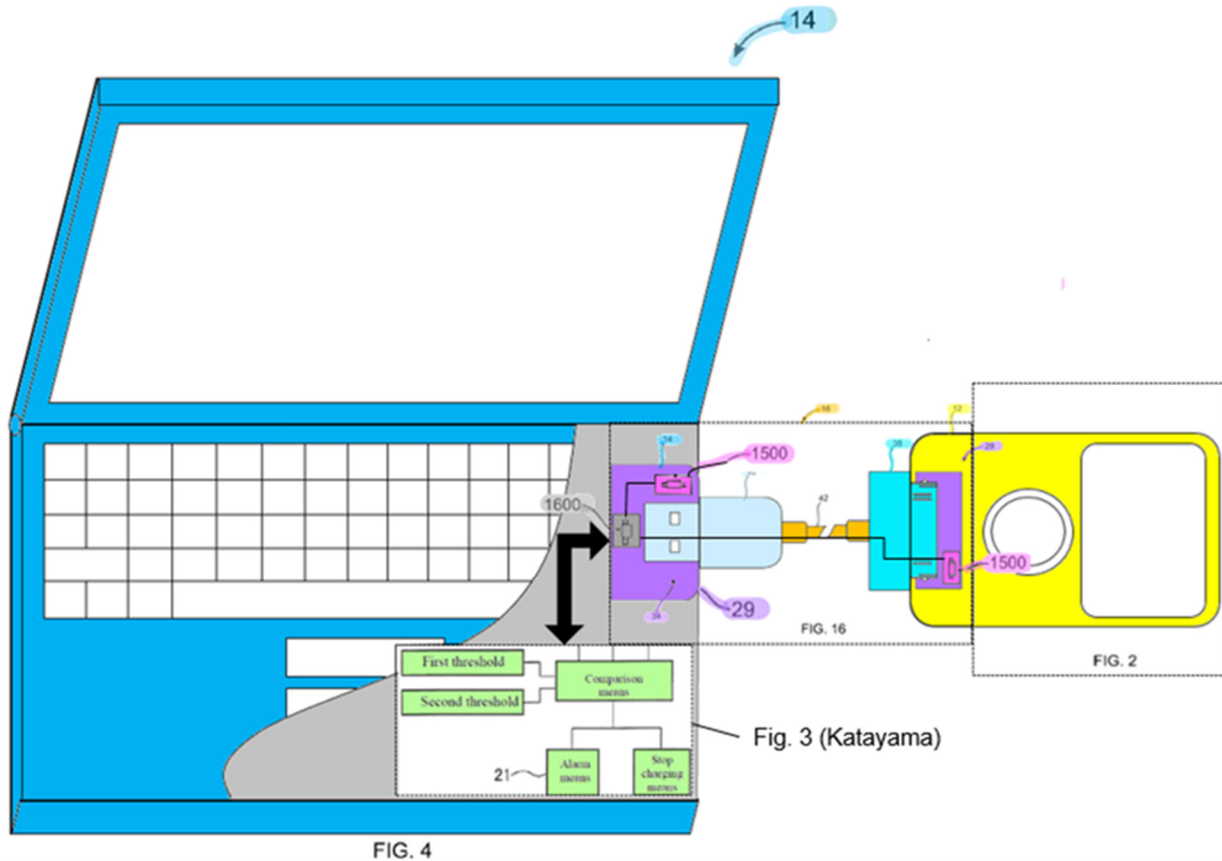
FIG. 3



Katayama thus teaches measuring temperature changes at least at each end of a charging connection, and in the connection itself.

Katayama also teaches “comparison means 20” for comparing measured temperatures from “temperature sensors 17, 18, 19.” Ex-1007 ¶18. Katayama teaches that there is a “temperature at which the charging cable 3 or 4 or the connector 5 may burn out.” *Id.* Katayama teaches to determine, using comparison means 20, “[if] any one of the temperature sensors 17, 18, 19 is at or above” the temperature where such burn-out damage may occur. *Id.* A POSITA would have understood that the greatest risk of damage is at the sensor measuring the greatest temperature change as that would burn out before places experiencing a lesser temperature change. Ex-1002 ¶105.

Combining these teachings of Rabu and Katayama is a system in which power supply 14 and battery-operated mobile device 12 (taught by Rabu), each contain thermal protection sensors and circuits (taught by Rabu and Katayama), for taking temperature change measurements in multiple locations (as suggested by Rabu and disclosed by Katayama) such as depicted here.



In the Rabu-Katayama combined thermal protection circuit, a temperature sensor measures temperature at second device 12, another sensor measures temperature at first device 14, and a power cutoff circuit at first device 14, which can shut off power to the second device 12. Ex-1002 ¶107; Ex-1005 ¶¶50, 77, 86, Figs. 9, 15; Ex-1007 ¶18, Fig. 3. A POSITA would have been motivated to design the protection circuit with a comparison means (taught by Katayama) for determining which of the two measured temperature changes (that is, the temperature rise measured at device 12 and the temperature rise measured at device 14) is greater, because the greater temperature change poses the greater danger of

permanent damage to the system.¹⁰ Ex-1002 ¶107; Ex-1007 ¶18. A POSITA would further have been motivated to combine, and had a reasonable expectation of success in, implementing the combined system for the reasons discussed in Section XII.A.1.

Rabu further teaches that the determination “is performed while the first device provides current to the second device over the connection.” Rabu teaches that if “the difference between the power *being delivered* to cable 16 and the power *being received* through cable 16” is significant, then “a short has likely formed” because the system is “likely *being heated* from the short (e.g., because lost power may typically be transformed into heat).” Ex-1005 ¶87. Accordingly, the device “being heated” from a short, and the corresponding temperature rise being measured in the device, happens when current is being delivered and received over the connection, as claimed. Ex-1002 ¶112.

¹⁰ To the extent that PO were to argue that this “determining” step further requires a specific comparison of two different temperature change values, measured at two different sensor locations, such a comparison also would have been obvious in view of Katayama’s teachings. Katayama specifically includes a “comparison means” for comparing the results of multiple sensor measurements to a threshold value. Ex-1007 ¶18, Fig. 3. It would have been obvious to use the same comparison means also to compare two different temperature change values to each other. This would allow for the system to detect, for example, an accelerated rise in temperature at one wire end as compared to the other. A POSITA would have been motivated to make this comparison in order to identify and locate the short circuit as early as early as possible. Ex-1002 ¶108.

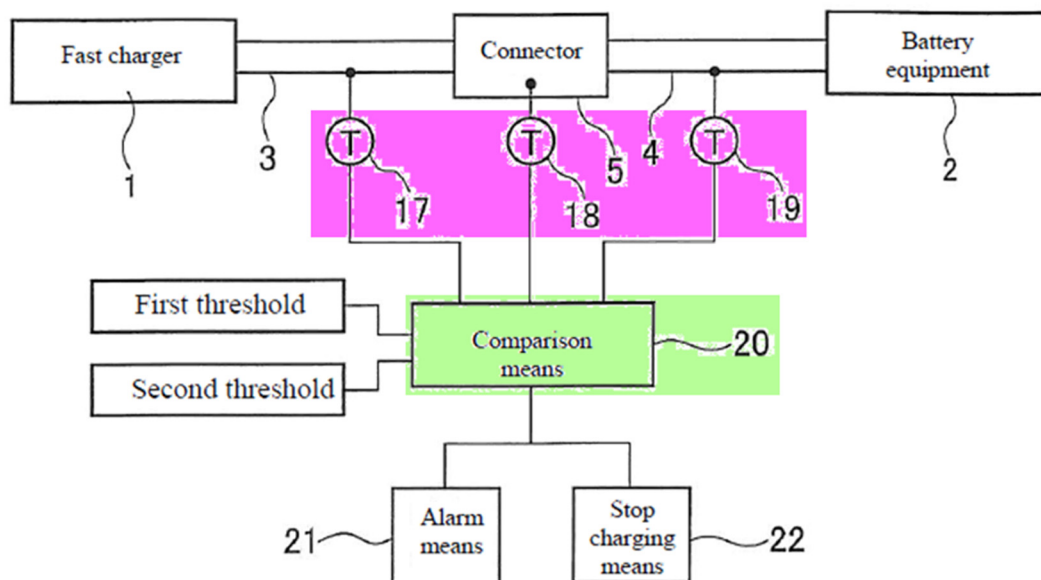
e. **1[D] - determining if the greater of the changes in temperature is above a threshold;**

Rabu and Katayama teach the limitations of element 1[D]. Ex-1002 ¶¶114-18.

For example, Rabu teaches determining “[w]hen the temperature of connector 38 exceeds a threshold temperature such as a threshold value less than 85° C., a threshold value of 85° C., a threshold value of 90° C., a threshold value of 95° C., a threshold value of 100° C., a threshold value of greater than 100° C., *or any other suitable threshold temperature.*” Ex-1005 ¶52.

Additionally, Katayama teaches two different temperature thresholds in Figure 3:

FIG. 3



Katayama teaches “comparison means 20 for comparing whether or not the measured temperature of any one of the temperature sensors 17, 18, 19 is at or above or at or below *the first threshold value* or is at or above or at or below *the second threshold value*.” Ex-1007 ¶18.

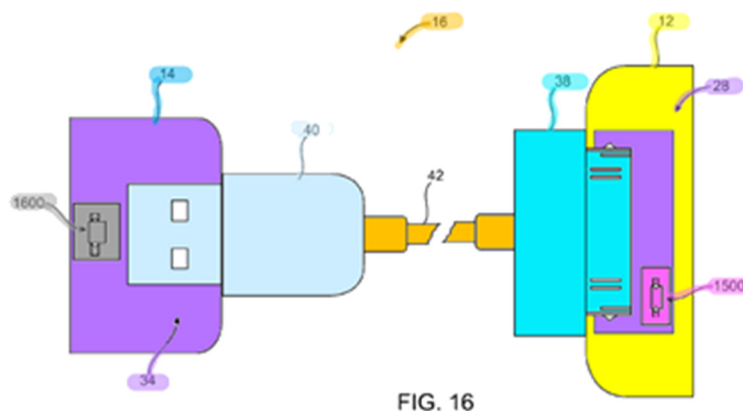
In the combined system, the greater temperature change, determined as described above in Section XII.A.2.d (for element 1[C]), would have been compared to a threshold as described in each of Rabu and Katayama. As previously discussed, the greater temperature change would represent the greater risk of harm to the system. A POSITA would have applied Rabu’s and Katayama’s threshold teachings to establish a pre-set or predefined temperature change threshold that would be used by the protection circuit to prevent harm to the device. Ex-1002 ¶118. As both of these references establish, a POSITA would have understood that the use of temperature thresholds was a common technique to evaluate the output of temperature sensors and take appropriate corrective action. *Id.* ¶118.

- f. **1[E] - if the greater of the changes in temperature is above the threshold, reducing the current being provided from the first device to the second device.**

Rabu and Katayama teach the limitations of element 1[E]. Ex-1002 ¶¶119-29.

Rabu teaches when “temperature is above the threshold, reducing the current being provided from the first device to the second device.” For example, the current is reduced to zero when the power is shut off. Ex-1002 ¶120. Rabu teaches that “a cable may include thermal protection circuitry that *reduces* or eliminate[s] power supply signals flowing to a connector in the cable when it is determined that the temperature of the connector has risen above a given threshold.” Ex-1005 ¶32. Rabu also teaches thermal protection circuitry that shuts off power “when the temperature in the connector 38 exceeds a threshold level” to “help to protect electronic device 12 from excessive heat.” *Id.* ¶48.

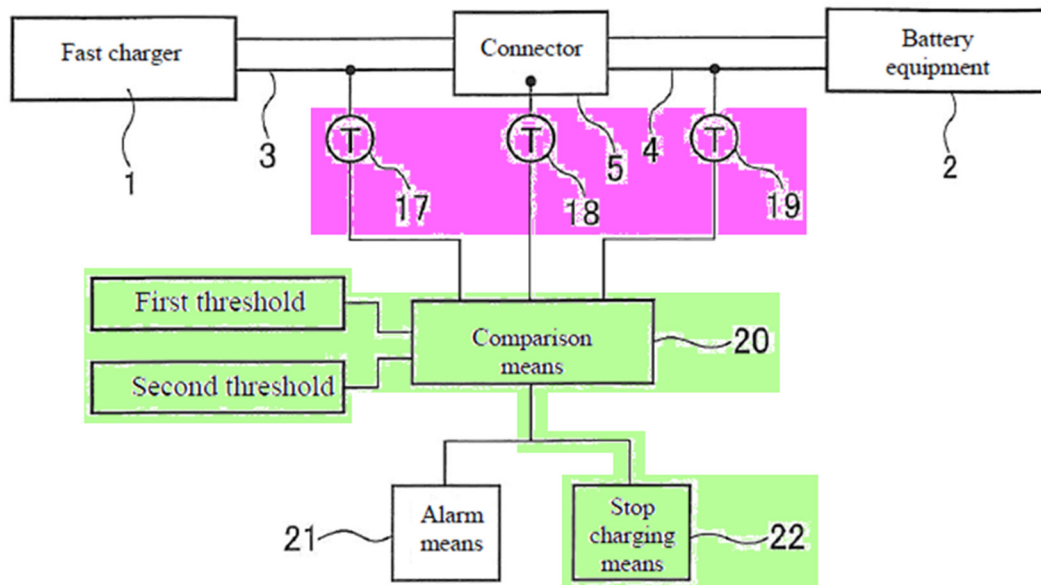
Rabu further teaches temperature “sensor 1500 may determine the temperature of connector 38 and may relay signals to cutoff switch 1600 indicative of the temperature of connector 38.” Ex-1005 ¶78, Fig. 16. Locating the cutoff switch in portable computer 14 allows the system to cut off power at the device that provides power.



Alternatively, the cutoff switch may be located in the cable connector. Ex-1005, Fig. 15; *id.* ¶77 (“temperature sensor 1500 in electronic device 12 may be able to sense the temperature of connector 38 of cable 16 and convey signals to cutoff switch 1502 representative of the temperature of connector 38”).

Katayama also teaches this feature, namely shutting off the charging current when the temperature threshold is exceeded. In Figure 3, the comparison means 20 connects to each of the temperature sensors 17, 18, and 19 and triggers “charging stop means 22” when a temperature threshold is exceeded. Ex-1007, Fig. 3.

FIG. 3



A POSITA would have been motivated to combine the teachings of Rabu and Katayama to design a system that reduces current when any of several

temperature readings exceeds a certain temperature threshold because the resulting system is safer and more efficient. Ex-1002 ¶126.

3. Independent Claim 9

a. 9[Pre] - A device, comprising:

Rabu teaches the limitations of element 9[Pre], for the same reasons discussed in Section XII.A.2.b (for element 1[A]). Ex-1002 ¶130.

b. 9[A] - a connection coupling a first device and a second device;

Rabu discloses the limitations of element 9[A], for the same reasons discussed in Sections XII.A.2.b-c (for elements 1[A] and 1[B]). Ex-1002 ¶¶131-33.

Indeed, in Figure 1, Rabu teaches two electronic devices, 12 and 14, and wired path, such as path 16, which may be used to connect device 12 to device 14 and may be used to convey signals such as data and power signals between the devices. Ex-1005 ¶¶12, 34. Wired path 16 is a connection coupling one device to another device. Ex-1002 ¶132.

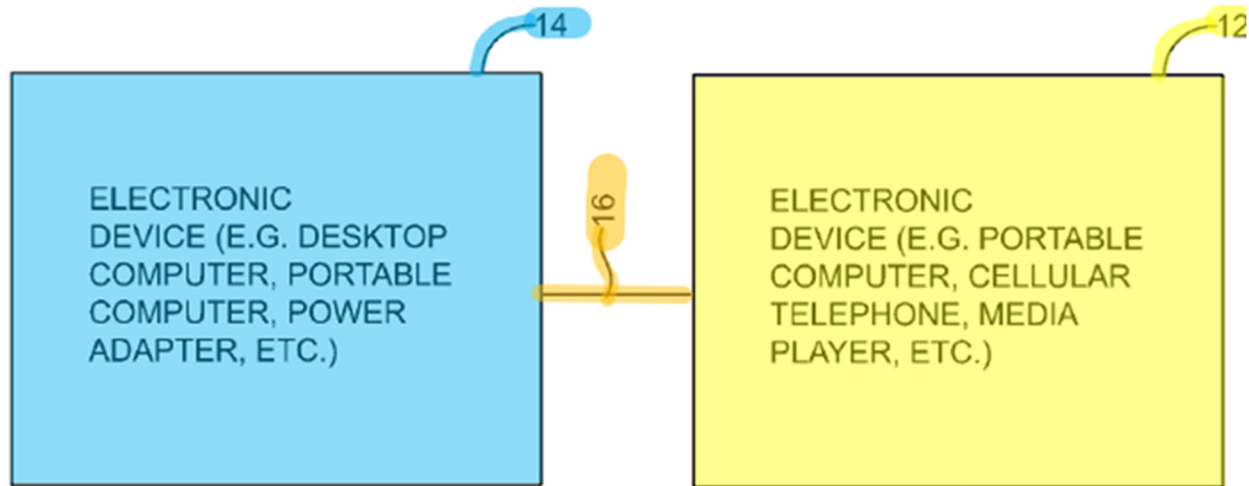
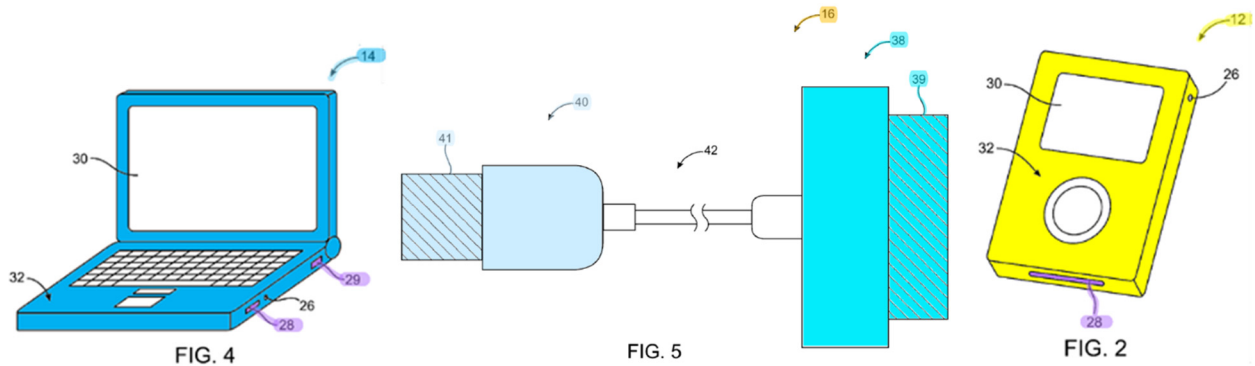


FIG. 1 (rotated)

In Figures 4, 5, and 2, cable path 16 connects device 14 (the claimed first device)¹¹ with device 12 (the claimed second device). Ex-1005 ¶40, Figs. 2, 3, 5. Rabu explains that the cable includes connectors for coupling devices: “cable 16 includes first connector 38, second connector 40, and communications path 42 between connectors 38 and 40.” *Id.* ¶40. Connector 38 can couple with connector 28 of device 12. *Id.* Connector 40 can couple with connector 29 of device 14. *Id.*

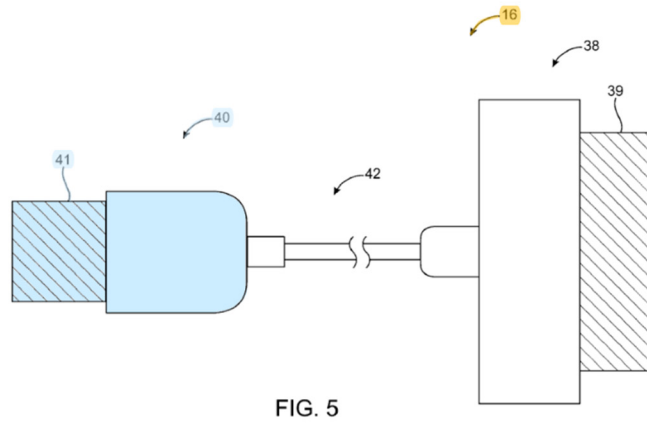
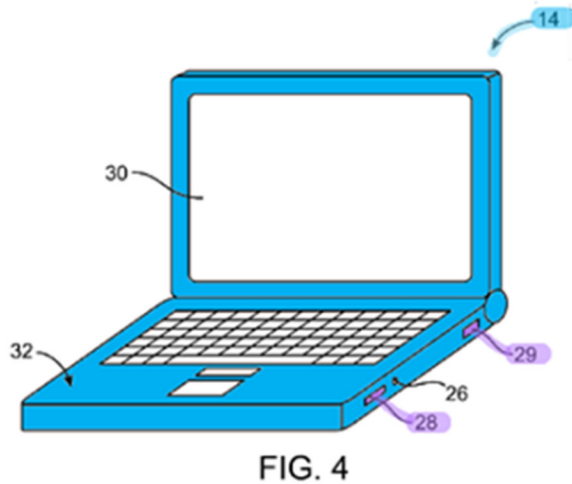
¹¹ Because claim element 9[D] requires that the “the second logic [of the first device] is configured to provide current to the second device,” Petitioner maps Rabu’s portable computer 14, or other devices 14 that provide power to the second device, to the claimed “first device.”



- c. **9[B] - a first port of the first device, wherein the first port is configured to receive a first connector of the connection;**

Rabu discloses the limitations of element 9[B], for the same reasons discussed in Section XII.A.2.b (for element 1[A]). Ex-1002 ¶¶134-35.

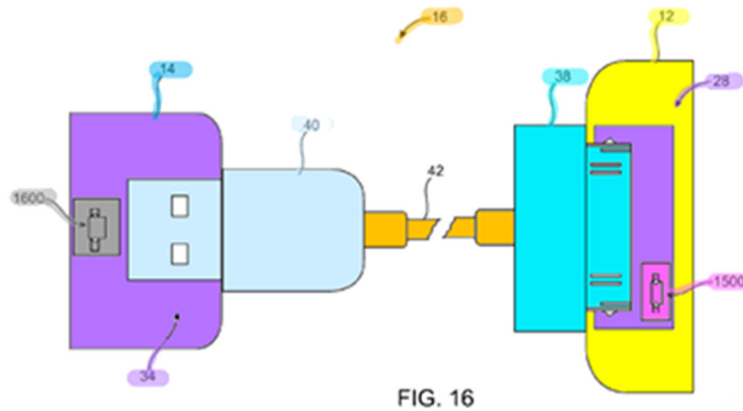
Rabu teaches that device 14 (the first device) may have connectors that couple to one or more connectors in path 16. Ex-1005 ¶¶39, 40, Fig. 4. For example, in Figure 4, Rabu discloses that “[d]evice 14 may [] have connectors such as connector 28 and connector 29,” which “may be 30-pin connectors, Universal Serial Bus (USB) ports, connectors that couple to one or more connectors in path 16” and “may be used to convey power signals over path 16 from device 14 to device 12 (e.g., for powering device 12 and for charging a battery in device 12).” *Id.* ¶¶38-40, Figs. 3-4.



- d. **9[C] - first logic of the first device coupled to the first port, wherein the first logic is configured to determine a temperature of the connection at the first connector;**

Rabu teaches the limitations of element 9[C], for the same reasons discussed in Section XII.A.2.b (for element 1[A]). Ex-1002 ¶¶136-40.

In addition, in Figure 16, Rabu teaches that the system's "thermal protection circuitry ... may include temperature sensor 1500 in electronic device 12 (e.g., sensor 1500 in connector 28) and a cutoff switch 1600 in electronic device 14." Ex-1005 ¶78. Rabu also explains that temperature protection circuit provided in portable computer 14 may include temperature sensors. *Id.* ("thermal protection circuitry may be provided in electronic device 12 and in electronic device 14"), ¶46 ("[t]hermal protection circuitry 710 may include a temperature-sensitive device such as a temperature sensor"); Ex-1002 ¶¶139-40 (explaining that it would have been obvious to implement temperature sensor in control logic circuitry or as an integrated circuit, including in view of Figures 10 and 11 and element 1100).



- e. **9[D] - second logic of the first device, wherein the second logic is configured to provide current to the second device over the connection;**

Rabu teaches the limitations of element 9[D]. Ex-1002 ¶¶141-44.

Rabu discloses conductors to carry power and signals from the device providing power to the device receiving power. For example, “the positive power supply voltage may be conveyed to connector 38 over conductor 910 (e.g., one of a plurality of conductors in path 42)” within cable 16. Ex-1005 ¶51, Fig. 9. A POSITA would have understood that conductors are “configured to provide current to the second device over the connection.” Ex-1002 ¶144. Moreover, a POSITA would have understood that Rabu’s power cutoff switch is a logic circuit, as it “may include a number of circuit components such as transistors, resistors, capacitors, etc.” that may block power delivery by interrupting the flow of current. *Id.* ¶143 (citing Ex-1005 ¶¶55, 56, 62, Fig. 10, Fig. 11).

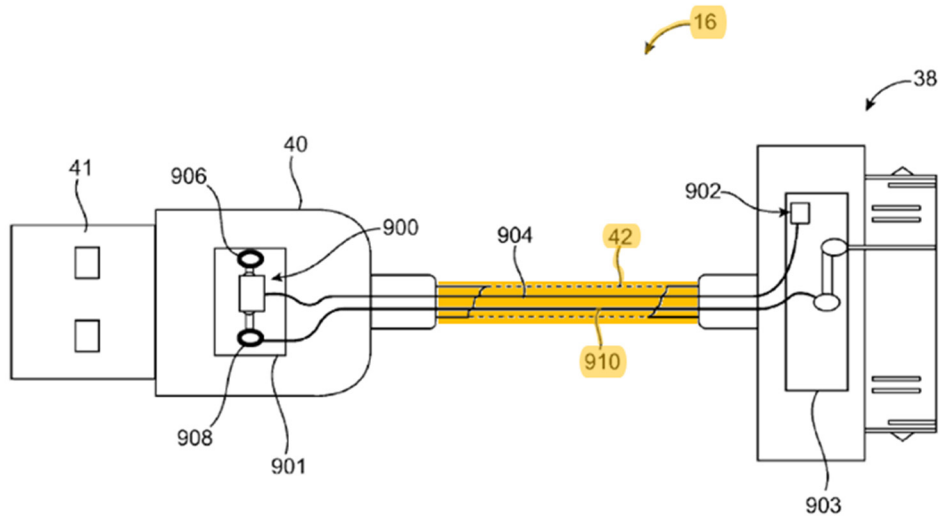
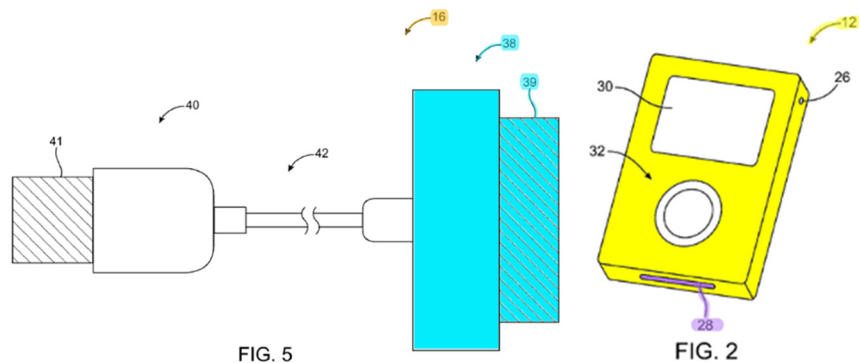


FIG. 9

- f. **9[E] - a second port of the second device, wherein the second port is configured to receive a second connector of the connection;**

Rabu teaches the limitations of element 9[E], for the same reasons discussed in Section XII.A.2.c (for element 1[B]). Ex-1002 ¶¶145-46.

This is shown, for example, in Rabu's Figure 2 as item 28 (second port) and in Rabu's Figure 5 as item 38 (second connector). Ex-1005, Figs. 2, 5.



- g. 9[F] - third logic of the second device coupled to the second port, wherein the third logic is configured to determine a temperature of the connection at the second connector;**

Rabu teaches the limitations of element 9[F], for the same reasons discussed in Sections XII.A.2.b-c (for elements 1[A] and 1[B]). Ex-1002 ¶¶147-49.

Rabu teaches “third logic of the second device coupled to the second port [of the second device]” for the same reasons discussed in Sections XII.A.2.b-c (for elements 1[A] and 1[B]). Specifically, in Figures 15 and 16, Rabu teaches including a temperature sensor in the port of device 12 (the claimed second device), into which the cable connector connects. Rabu explains that “temperature sensor 1500 [is] in electronic device 12” and states that temperature sensor 1500 (pink) “may be able to sense the temperature of connector 38 of cable 16.” Ex-1005 ¶77; *id.* ¶78 (“thermal protection circuitry ... may include temperature sensor 1500 in electronic device 12 (e.g., sensor 1500 in connector 28) and a cutoff switch 1600 in electronic device 14” and “sensor 1500 may determine the temperature of connector 38 and may relay signals to cutoff switch 1600 indicative of the temperature of connector 38”). As shown, temperature sensor 1500 (the claimed third logic) sits in port 28 of device 12. Ex-1002 ¶149 (explaining that it would have been obvious to implement temperature sensor 1500 in control logic circuitry or as an integrated circuit, including in view of element 1100).

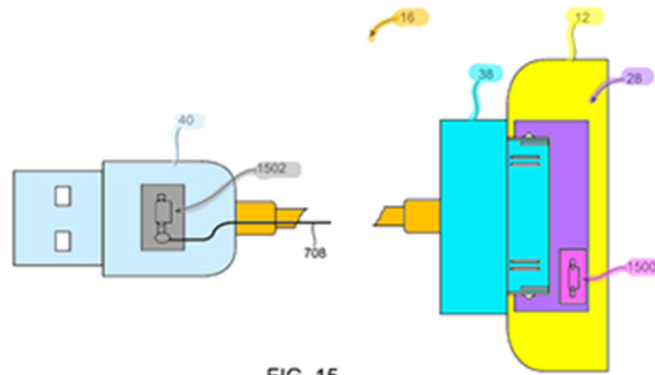


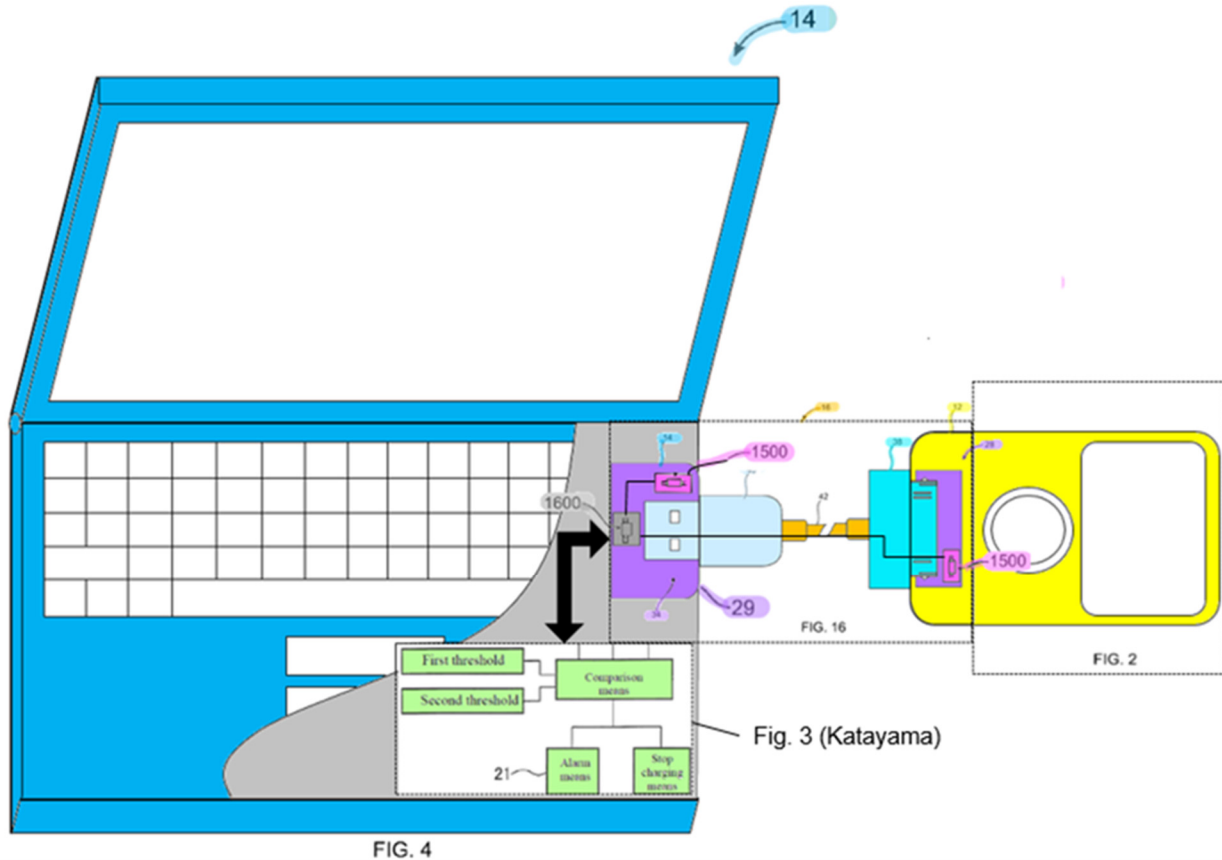
FIG. 15

- h. **9[G] - wherein, in response to the greater of the change in temperature determined by the first logic and the change in temperature determined by the third logic being above a threshold, the second logic is configured to reduce the current being provided from the first device to the second device.**

Rabu and Katayama teach the limitations of element 9[G], for the same reasons discussed in Sections XII.A.2.d-f (for elements 1[C], 1[D], and 1[E]). Ex-1002 ¶150.

While using slightly different words, Rabu and Katayama teach this claim element for the reasons described in connection with Claim 1. Specifically, in the combined system, the “first logic” and “third logic” correspond to Rabu’s temperature sensing circuitry measuring temperature (pink) in first device (14) (blue) and in second device (12) (yellow), respectively. The “second logic” corresponds to Rabu’s power supply and “cutoff switch 1600” (gray), combined with Katayama’s comparison means 20 and stop charging means (green), which as Rabu explains may be located in portable computer 14 (the first device). Ex-1005

¶78; Ex-1007 ¶18, Fig. 3. With these identifications, this claim element is taught by the prior art as described above for Claim 1.



4. Dependent Claims 5-8, 12, and 13

- a. **Claim 5 - The method of claim 1, wherein said determining the change in temperature comprises: determining a temperature of a first connector of the connection by measuring a temperature of an electrical assembly connected to the first connector of the first device or the second device.**

Rabu and Katayama teach the limitations of Claim 5, for the same reasons discussed in Sections XII.A.2.b-c (for elements 1[A] and 1[B]). Ex-1002 ¶151.

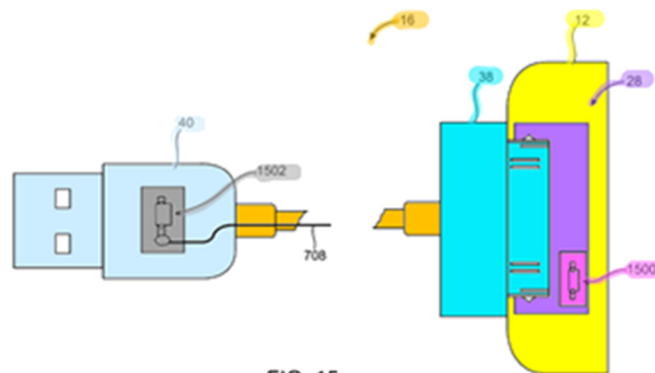
b. Claim 6 - The method of claim 1, wherein said determining the change in temperature comprises: determining a temperature near a power pin of the first connector of the connection.

Rabu and Katayama teach the limitations of Claim 6 for the same reasons discussed in Section XII.A.2.b (for element 1[A]). Ex-1002 ¶¶152-54.

Rabu discloses “a power pin of the first connector of the connection.” Rabu teaches device 14 may have connectors that couple to one or more connectors in path 16. Ex-1005 ¶39, Figs. 3, 4. For example, in Figure 3, Rabu discloses “[c]onnector 34 may be ... a 30-pin connector,” which “may mate with a connector in path 16 ... and may be used to convey power signals over path 16 from device 14 to device 12 (e.g., for powering device 12 and for charging a battery in device 12).” *Id.* ¶38. Connector 34 is a port in the device providing power, which connects with connector 40 of the cable. *Id.* ¶40, Figs. 3, 5. Indeed, the “cable may have a 30-pin connector,” which may be used to deliver power from one device to another device. *Id.* ¶29. “***Pins in the 30-pin connector receive power*** from the conductors in the cable ***and deliver power*** with corresponding pins in a media player, cellular telephone, or other electronic device.” *Id.*

Rabu also teaches “determining a temperature near” the power pins of the connectors for the same reasons discussed in Section XII.A.2.b (for element 1[A]). For example, the temperature sensor shown in Figure 15 is near the pins, including the power pin, of connector 38, because the temperature sensor is in the port where

the connector pins connect to the device. A POSITA would have located the temperature sensor near a power pin because this is a location where dendritic shorts would be expected to occur.



- c. **Claim 7 - The method of claim 1, wherein said determining the change in temperature comprises: determining a temperature near a data pin of the first connector of the connection.**

Rabu, Katayama teach the limitations of Claim 7, for the same reasons discussed in Section XII.A.4.b (for Claim 6). Ex-1002 ¶155-56.

Specifically, the pins of the 30-pin connector at the end of cable 16 deliver data as well as power: “The conductive lines in path 16 may be *used to convey signals such as data* and power signals over path 16.” Ex-1005 ¶34, Figs. 3, 4. As explained for Claim 6, the temperature sensor in Figure 15 is near the pins, including the data pin, of connector 38, because the temperature sensor is in the port where the connector pins connect to the device. A POSITA would have

located the temperature sensors near a data pin because this is a location where dendritic shorts would be expected to occur.

d. Claim 8 - The method of claim 1, wherein said reducing the current is performed by the first device.

Rabu and Katayama teach the limitations of Claim 8, for the same reasons discussed in Section XII.A.2.f (for element 1[E]). Ex-1002 ¶157. As explained by Rabu, the “cutoff switch,” which reduced power to the second device, may be located in portable computer 14 (the first device). Ex-1005 ¶78.

e. Claim 12 - The device of claim 9, wherein said first logic is configured to: determine a temperature of the first connector of the connection by measuring a temperature of the port.

Rabu and Katayama teach the limitations of Claim 12, for the same reasons discussed in Sections XII.A.3.b-c (for elements 9[A] and 9[B]). Ex-1002 ¶158.

f. Claim 13 - The device of claim 9, wherein said first logic is configured to: determine a temperature near a power pin of the first connector of the connection; or determine a temperature near a data pin of the first connector of the connection.

Rabu and Katayama teach the limitations of Claim 13, for the same reasons discussed in Sections XII.A.4.b (for Claim 6) and XII.A.4.c (for Claim 7). Ex-1002 ¶159.

B. Ground 2: Claims 1, 5-9, 12, and 13 Are Rendered Obvious by Rabu-Katayama and Further in View of Shoji, Ex-1006

1. A POSITA Would Have Been Motivated to Combine the Teachings of Rabu-Katayama, and Shoji, and Would Have Had a Reasonable Expectation of Success in Doing So

As explained above on Section XIIA.1, a POSITA would have been motivated to combine the teachings of Rabu and Katayama (“Rabu-Katayama”). To the extent that a POSITA would have required additional teachings about temperature sensors at both ends of a charging circuit, those teachings would have been found in Shoji. Ex-1002 ¶¶160-62.

Like Rabu and Katayama, Shoji also relates to a portable charging device with thermal sensors designed to protect the devices by turning off the current in response to excessive heat. Ex-1006, Abstract. Specifically, Shoji teaches equipping both the charger and the device being charged with temperature sensing circuits to stop charging if either the charger or device gets too hot. *Id.* at 13, Fig. 3.

In view of these related teachings, a POSITA would have been motivated to combine the teachings of Rabu, Shoji, and Katayama, and a POSITA would have a reasonable expectation of success in doing so. A POSITA would have been motivated to combine these interrelated teachings because the end result would be a better design for preventing temperature spikes and damage caused by electrical shorts. Ex-1002 ¶162. Like Rabu and Katayama, Shoji teaches the benefit of using

thermal protection circuits in both the device providing power and the device receiving power to measure temperature at these locations. Ex-1006, 11, 13. And further like Rabu and Katayama, Shoji also teaches incorporating temperature sensors to protect the devices. *Id.* at 11. And a POSITA would have had a reasonable expectation of success in combining those components into one system because it was well known in the art that analog components can be adapted for connection with digital components, and vice versa, as well as that hardware components may be converted into software components, and vice versa, to construct an operable system. Ex-1002 ¶162.

As such, in the combined Rabu-Katayama-Shoji system, a POSITA would have been motivated to achieve the most complete possible thermal and power control using the benefits taught by each reference because such a system would operate more efficiently and with less risk of catastrophic failure to the device attached at each end of the connection. Ex-1002 ¶162. The benefit of an improved system preventing dendritic shorts is to protect cables, their ports and connectors, and the connected electronic devices themselves from excessive heat buildup, permanent damage, and risk of fire. *Id.* ¶154.

To the extent necessary, Shoji is brought into the combination for additional teachings as to claim elements 1[A], 1[C], 9[C], 9[D], and 9[G] as discussed below. For all other elements (1[Pre], 1[B], 1[D], 1[E], 9[Pre], 9[A], 9[B], 9[C],

9[E], and 9[F]) and claims (5-8, 12, and 13) of this ground, the teachings of Rabu-Katayama apply the same as was applied in the discussion of Ground 1, in Section XII.A, above.

2. Independent Claim 1

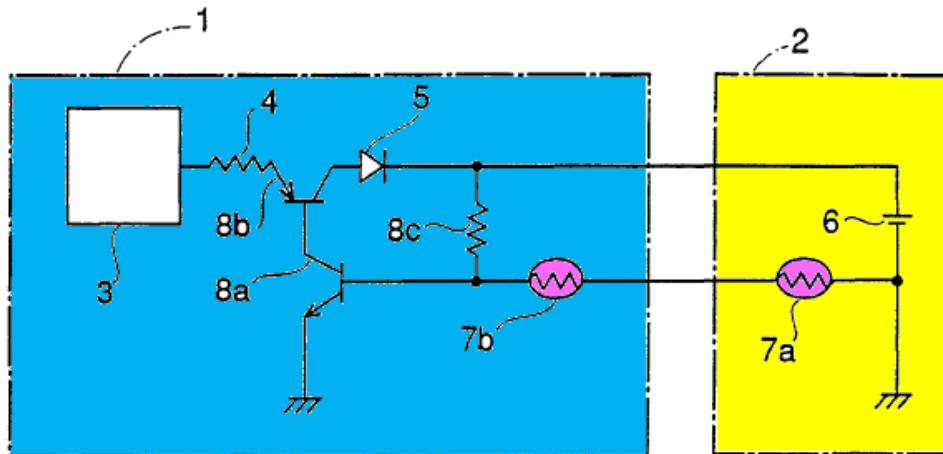
a. 1[A] - determining a change temperature ... to a second device;

Rabu-Katayama and Shoji teach the limitations of element 1[A]. Ex-1002 ¶¶164-69.

Regarding Rabu, *see* Section XII.A.2.b, above.

Shoji expressly teaches to include a temperature sensor both in the power supply device and in the battery-operated device receiving current from the power supply. This is shown, for example, in Shoji's Figure 3. Charger 1 (blue, corresponding to the claimed first device) includes thermistor 7b (pink). The charger is connected to battery-operated device 2 (yellow, corresponding to the claimed second device), which includes thermistor 7a (pink). Ex-1006, 10, 13. Moreover, Charger 1 and Device 2 are removably connected via a "three-terminal" or "two-terminal" connector. *Id.* at 15.

Fig.3



Shoji expressly teaches reasons to include a temperature sensor at both the charger (claimed first device) and the battery-powered device receiving the current (claimed second device). Regarding the temperature sensor in the claimed second device, Shoji teaches that temperature sensor 7a allows for “overcharging and overheating of the secondary battery [to] be prevented by a simple circuit.” Ex-1006, 15. Regarding the temperature sensor in the claimed first device, Shoji teaches that “the charger also includes a second temperature detecting element for detecting the temperature of the charger,” so that “the stability of the charging operation even during when the charger is at high temperature is secured.” *Id.* at 6-7. Accordingly, a POSITA would have been motivated to measure temperature in both Rabu’s portable computer and the device being charged so that “the stability

of the charging operation ... is secured,” as taught by Shoji, in the event of Rabu’s shorts or dendritic growths developing at either location. Ex-1002 ¶167; Ex-1005, Fig. 3; Ex-1006, 6-7, Fig. 3.

b. 1[C] - determining the greater of the changes in temperature ... over the connection;

Rabu-Katayama and Shoji teach the limitations of element 1[C]. Ex-1002 ¶¶170-75.

Regarding Rabu-Katayama, *see* Section XII.A.2.d, above.

Shoji teaches that a temperature change greater than a fixed value may cause damage to the system. Ex-1006, 11. A POSITA would have understood that the greatest risk of damage is at the sensor measuring the greatest temperature change. Ex-1002 ¶172. Accordingly, a POSITA would have understood that determining which sensor measures the greatest temperature change identifies where the circuit has the greatest risk of thermal failure and where temperature needs to be reduced in order to lessen such risk. *Id.*

Combining those teachings of Rabu, Shoji, and Katayama is a system in which portable computer 14 and battery-operated mobile device 12 (taught by Rabu), each contain thermal protection sensors and circuits (taught by Rabu and Shoji), for taking temperature change measurements in multiple locations (taught by Katayama). In this way, in the Rabu-Katayama-Shoji combined thermal protection circuit, a temperature sensor measures temperature at device 12, another

sensor measures temperature at device 14, and a power cutoff circuit at device 14 can shut off power to the connector. Ex-1002 ¶173; Ex-1005 ¶¶50, 77, Figs. 9, 16; Ex-1006, 13, Fig. 3; Ex-1007 ¶18, Fig. 3.

Shoji discusses operating at certain ambient temperatures and potentially unsafe conditions related to “temperature rise” over ambient. Ex-1006, 3. Those teachings would have further taught a POSITA that each temperature sensor in the system should measure and respond to temperature changes over ambient temperature, and they provide additional motivations for calculating specific changes in temperature relative to some reference value (e.g., an ambient temperature). Ex-1002 ¶175. Measuring such temperature changes relative to a reference would have provided another level of monitoring for and control against potentially dangerous conditions. *Id.*

3. Independent Claim 9

a. 9[C] - first logic of the first device ... at the first connector;

Rabu-Katayama and Shoji teach the limitations of element 9[C], for the same reasons discussed in Section XII.B.2.a (for element 1[A]). Ex-1002 ¶¶176-79.

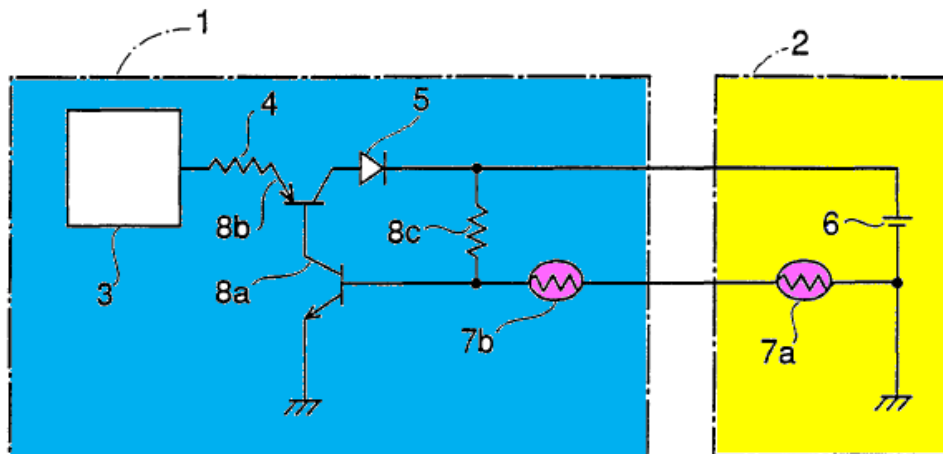
Regarding Rabu, *see* Section XII.A.3.d, above.

Additionally, as discussed above in Section XII.B.2.a (for element 1[A]), Shoji expressly teaches measuring temperature using temperature sensors both in

the power supply device and in the battery-operated device receiving current from the power supply. This is shown, for example, in Shoji's Figure 3. Charger 1 (blue, corresponding to the claimed first device) includes thermistor 7b (pink).

Thermistor 7b determines the temperature, and components 8a, 8b, and 8c comprise logic used to determine when to shut-off the power based on that temperature. Ex-1006, 10-11.

Fig.3



A POSITA would have been motivated to combine the teachings of Rabu and Shoji to implement a system in which both power supply 14 and battery-operated mobile device 12 are protected by thermal protection sensors and logic circuits for the reasons discussed above in Section XII.B.2.a (for element 1[A]).

Ex-1002 ¶179.

b. 9[D] - second logic of the first device, ... over the connection;

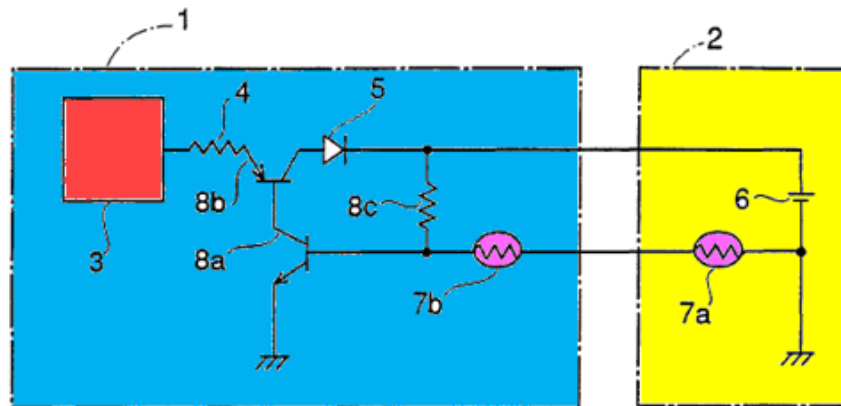
Rabu-Katayama and Shoji teach the limitations of element 9[D]. Ex-1002

¶¶180-83.

Regarding Rabu, *see* Section XII.A.3.e, above.

Shoji expressly teaches a second logic configured to provide current to the second device in form of voltage source 3 (red). Ex-1006, 9.

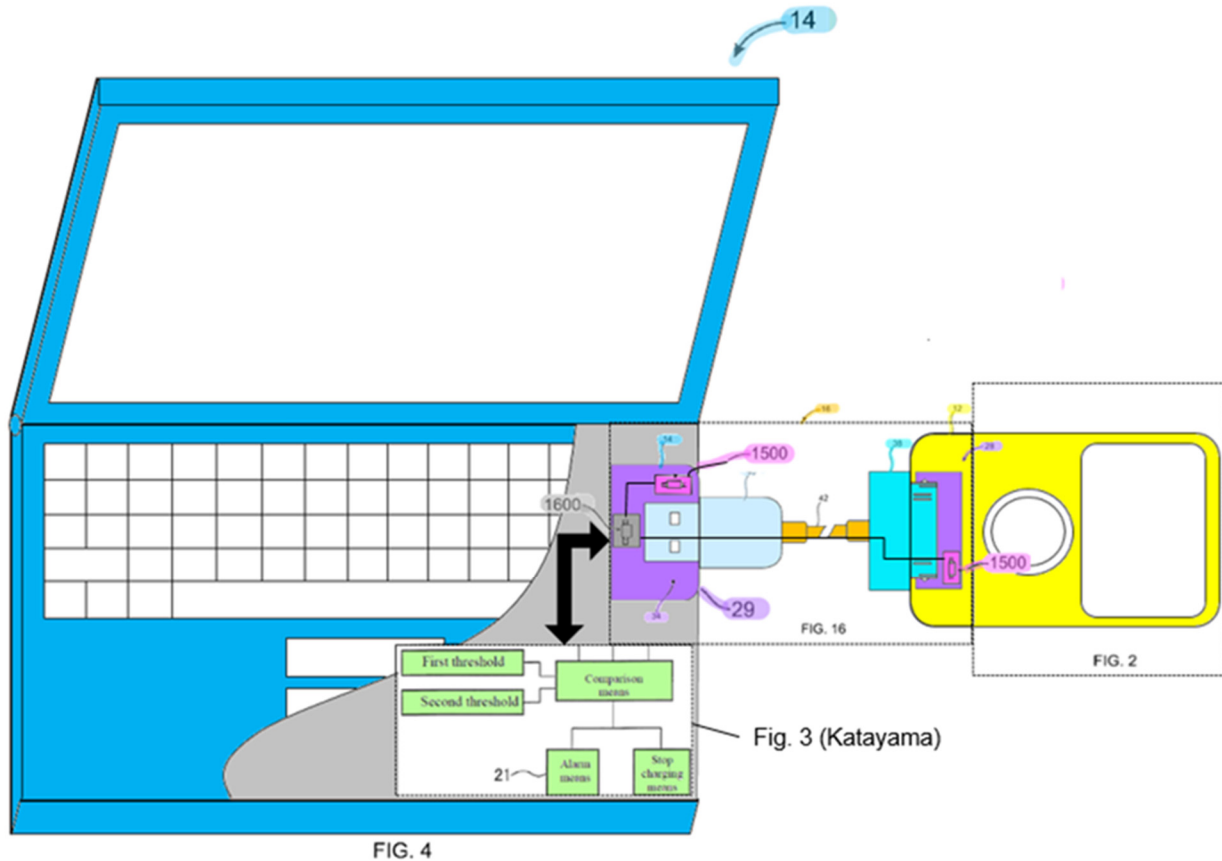
Fig.3



A POSITA would have been motivated to combine the teachings of Rabu and Shoji to implement a system with the second logic as claimed for the reasons discussed above in Section XII.B.2.a (for element 1[A]). Ex-1002 ¶183.

c. 9[G] - wherein, in response to the greater of the change in temperature ... to the second device.

Rabu, Katayama, and Shoji teach the limitations of element 9[G], for the same reasons discussed in Sections XII.A.3.h (for element 9[G]) and XII.B.2.b (for element 1[C]). Ex-1002 ¶184. While using slightly different words, Rabu, Katayama, and Shoji teach this claim element for the reasons described in connection with Claim 1. Specifically, in the combined system, the “first logic” and “third logic” correspond to Rabu’s temperature sensing circuitry measuring temperature (pink) in first device (14) (blue) and in second device (12) (yellow), respectively. The “second logic” corresponds to Rabu’s power supply and “cutoff switch 1600” (gray), combined with Katayama’s comparison means 20 and stop charging means (green), which as Rabu explains may be located in portable computer 14 (the first device). Ex-1005 ¶78; Ex-1007 ¶18, Fig. 3. With these identifications, this claim element is taught by the prior art as described above for Claim 1.



C. Ground 3: Claims 1-13 Are Rendered Obvious by Rabu-Katayama, and Further in View of Karam, Ex-1008

1. A POSITA Would Have Been Motivated to Combine the Teachings of Rabu Katayama, and Karam, and Would Have Had a Reasonable Expectation of Success in Doing So

In addition to the reasons set out below with respect to specific claim elements, a POSITA would have been motivated to combine the teachings of Rabu, Katayama, and Karam, and would have a reasonable expectation of success in doing so, at least because each relates to safely charging electronic devices using thermal protection of circuits. Ex-1002 ¶¶185-87.

For the same reasons in Section XII.A.1, a POSITA would be motivated to combine Rabu and Katayama. A POSITA additionally would have been motivated to combine Karam with Rabu-Katayama.

Karam, like Rabu, relates to a method for controlling current based on temperature for electronic devices through a communication pathway. Ex-1005 ¶3; Ex-1008, 2:36-50. Specifically, Rabu discloses that a “cable may include thermal protection circuitry that reduces or eliminate power supply signals flowing to a connector in the cable when it is determined that the temperature of the connector has risen above a given threshold.” Ex-1005 ¶32. Karam discloses “generating a temperature change result” and “one of (i) enabling, (ii) scaling back, or (iii) disabling delivery of power to the remotely powerable device through the communications pathway based on the temperature change result.” Ex-1008, 2:45-50. A POSITA would have understood that Karam discloses an additional method of determining and controlling temperature for electronic devices and communication pathways. Ex-1002 ¶187. Thus, a POSITA would have combined the teachings of Rabu with Karam with a reasonable expectation of success as an alternative design choice. *Id.* And it would have been easy for a POSITA to combine those components into one system because it was well known in the art that analog components can be adapted for connection with digital components,

and vice versa, as well as that hardware components may be converted into software components, and vice versa, to construct an operable system. *Id.*

2. Independent Claim 1

a. 1[Pre] - A method for adjusting current based on temperature, comprising:

Rabu teaches the limitations of element 1[Pre], for the same reasons discussed in Section XII.A.2.a (for element 1[Pre]). Ex-1002 ¶188.

b. 1[A] - determining a change temperature at a first device wherein said temperature is measured at a first port of the first device that is configured to receive a connection to a second device;

Rabu and Karam teach the limitations of element 1[A]. Ex-1002 ¶¶189-95.

Rabu teaches the limitations of element 1[A], for the same reasons discussed in Sections XII.A.2.b (for element 1[A]).

Karam expressly discloses a calculation for a change in temperature. Karam discloses that “controller 88 performs one or more additional temperature calculations to confirm that the communications pathway 28 is at a dangerous temperature.” Ex-1008, 8:35-38. Karam explains that “the change in temperature of the communications pathway 28 which can be assumed to be the change in temperature of the copper material within the cabling 30 is capable of being determined using Equation (2)” shown below. *Id.* at 7:57-61.

$$\text{Change in Temperature} = \frac{R_OPERATING - R_INITIAL}{R_INITIAL \times 0.00393}. \quad (2)$$

Karam discloses that:

In Equation (2), 0.00393 in Ohms per degrees Celsius is the temperature coefficient of copper.” Also, “R_INITIAL is the resistance of the communications pathway 28 when the PSE 24 makes an initial baseline measurement (e.g., during an initial discovery phase prior to supplying power through the communications pathway 28).” “R_OPERATING is the resistance of the communications pathway 28 when the PSE 24 makes periodic measurements over time while supplying power to the PD 26.

Id. at 8:1-9. A POSITA would have understood that Karam discloses determining an initial temperature (R_INITIAL) a first time, a current temperature (R_OPERATING) a second time, and the difference between the two based on the equation disclosed. Ex-1002 ¶193.

A POSITA would have been motivated to combine the teachings of Karam with Rabu and Katayama because all are directed to methods for controlling current based on temperature of electronic devices. Ex-1005 ¶3; Ex-1007 ¶18, Fig. 3; Ex-1008, 2:36-50; Ex-1002 ¶194. Further, all teach measuring a change in temperature. Ex-1005 ¶76; Ex-1007 ¶18, Fig. 3; Ex-1008, 7:64-8:9. Karam’s disclosure of measuring a change in temperature over time benefits the Rabu-Katayama system because it protects the circuit and components from a rapid rise in temperature, which would likely result from a significant short. Ex-1002 ¶194.

A POSITA would have a reasonable expectation of success in combining Karam with Rabu because both teach similar structures and components, including a power source device (Ex-1005, Fig. 1 (Rabu's 14); Ex-1008, 3:41-43 (Karam's 24)), an electronic device (Ex-1005, Fig. 1 (Rabu's 12); Ex-1008, 3:41-43 (Karam's 26)), and a connector connecting a power source device and a portable electronic device (Ex-1005 ¶40 (Rabu's 16); Ex-1008, 3:41-43 (Karam's communications pathway 28)). Ex-1002 ¶195.

- c. **1[B] - determining a change temperature at a second device wherein said temperature is measured at a second port of the second device that is configured to receive the connection to the first device;**

Rabu and Karam teach the limitations of element 1[B], for the same reasons discussed in Sections XII.A.2.c (for element 1[B]) and XII.C.2.b (for element 1[A]). Ex-1002 ¶196.

- d. **1[C] - determining the greater of the changes in temperature measured at the first device and the second device, wherein said determining is performed while the first device provides current to the second device over the connection;**

Rabu, Katayama, and Karam teach the limitations of element 1[C]. Ex-1002 ¶¶197-99.

Rabu and Katayama teach the limitations of element 1[C], for the same reasons discussed in Sections XII.A.2.d (for element 1[C]).

Karam expressly discloses a calculation for a change in temperature for the same reasons discussed in Section XII.C.2.b (for element 1[A]). Ex-1002 ¶¶197-99; Ex-1008, 7:49-8:9.

e. 1[D] - determining if the greater of the changes in temperature is above a threshold;

Rabu, Katayama, and Karam teach the limitations of element 1[D], for the same reasons discussed in Sections XII.A.2.e (for element 1[D]) and XII.C.2.d (for element 1[C]). Ex-1002 ¶200.

f. 1[E] - if the greater of the changes in temperature is above the threshold, reducing the current being provided from the first device to the second device.

Rabu, Katayama, and Karam the limitations of element 1[E], for the same reasons discussed in Sections XII.A.2.f (for element 1[E]) and XII.C.2.d (for element 1[C]). Ex-1002 ¶201.

3. Independent Claim 9

a. 9[Pre] - A device, comprising:

Rabu and Karam disclose the limitations of element 9[Pre], for the same reasons discussed in Sections XII.A.3.a (for element 9[Pre]) and XII.C.2.b (for element 1[A]). Ex-1002 ¶202.

b. 9[A] - a connection coupling a first device and a second device;

Rabu and Karam disclose the limitations of element 9[A], for the same reasons discussed in Sections XII.A.3.b (for element 9[A]) and XII.C.2.b-c (for elements 1[A] and 1[B]). Ex-1002 ¶203.

c. 9[B] - a first port of the first device, wherein the first port is configured to receive a first connector of the connection;

Rabu and Karam disclose the limitations of element 9[B], for the same reasons discussed in Sections XII.A.3.c (for element 9[B]) and XII.C.2.b (for element 1[A]). Ex-1002 ¶204.

d. 9[C] - first logic of the first device coupled to the first port, wherein the first logic is configured to determine a temperature of the connection at the first connector;

Rabu and Karam disclose the limitations of element 9[C], for the same reasons discussed in Sections XII.A.3.d (for element 9[C]) and XII.C.2.b (for element 1[A]). Ex-1002 ¶205.

e. 9[D] - second logic of the first device, wherein the second logic is configured to provide current to the second device over the connection;

Rabu discloses the limitations of element 9[D], for the same reasons discussed in Section XII.A.3.e (for element 9[D]). Ex-1002 ¶206.

- f. 9[E] - a second port of the second device, wherein the second port is configured to receive a second connector of the connection;**

Rabu and Karam disclose the limitations of element 9[E], for the same reasons discussed in Sections XII.A.3.f (for element 9[E]) and XII.C.2.c (for element 1[B]). Ex-1002 ¶207.

- g. 9[F] - third logic of the second device coupled to the second port, wherein the third logic is configured to determine a temperature of the connection at the second connector;**

Rabu and Karam disclose the limitations of element 9[F], for the same reasons discussed in Sections XII.A.3.g (for element 9[F]) and XII.C.2.b-c (for elements 1[A] and 1[B]). Ex-1002 ¶208.

- h. 9[G] - wherein, in response to the greater of the change in temperature determined by the first logic and the change in temperature determined by the third logic being above a threshold, the second logic is configured to reduce the current being provided from the first device to the second device.**

Rabu, Katayama, and Karam disclose the limitations of element 9[G], for the same reasons discussed in Sections XII.A.3.h (for element 9[G]) and XII.C.2.d-f (for elements 1[C], 1[D], and 1[E]). Ex-1002 ¶209.

4. Dependent Claims 2-8 and 10-13

- a. Claim 2 - The method of claim 1, wherein said determining the change in temperature, said determining if the change in temperature is above the threshold, and said reducing the current is performed a plurality of times while the first device provides current to the second device over the connection.**

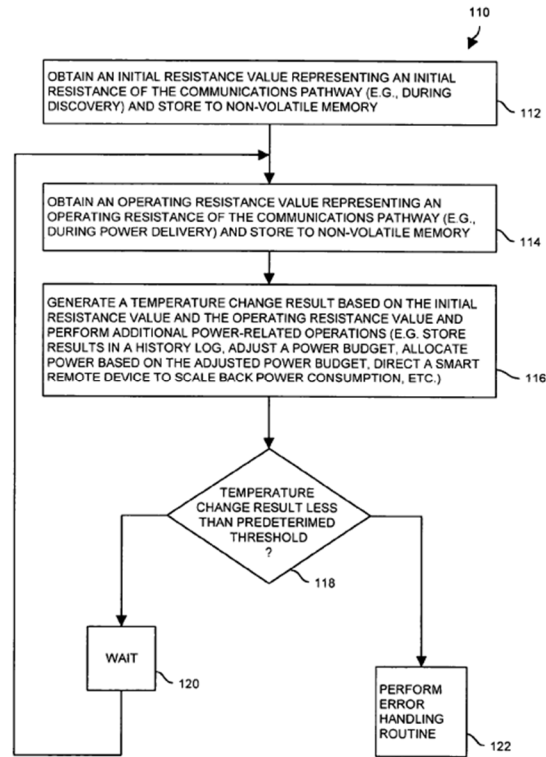
Rabu and Karam teach the limitations of Claim 2. Ex-1002 ¶¶210-14.

Rabu teaches the “while the first device provides current to the second device over the connection” portion of this claim for the same reasons discussed in Section XII.A.2.d (for element 1[C]).

Karam teaches “wherein said determining the change in temperature, said determining if the change in temperature is above the threshold, and said reducing the current is performed a plurality of times.” Ex-1002 ¶212. Shown below in Karam’s Figure 4 is procedure 110 which is performed by controller 88 of PSE 24. Ex-1008, 8:46-47. In step 116, Karam discloses that processor 98 of controller 88 “calculates the actual power loss through the communications pathway, adjusts a power budget of the PSE 24, and allocates power to other devices based on the adjusted power budget.” *Id.* at 9:3-6. Karam explains that “processor 98 repeats steps 114 and 116 (e.g., without waiting) at least one more time to confirm the rise in temperature before turning off delivery of power to the PD 26.” *Id.* at 9:26-29. Accordingly, a POSITA would have understood that repeating steps 114 and 116

includes reducing current a plurality of times by adjusting the power budget of PSE

24. Ex-1002 ¶212.



A POSITA would have been motivated to combine the teachings of Rabu and Karam because both are directed to methods for controlling current based on temperature of electronic devices. Ex-1005 ¶3; Ex-1008, 2:36-50. Karam's disclosure of repeating steps to confirm the rise in temperature benefits Rabu's system to ensure that a temperature exceeds a threshold amount before proceeding to reduce or eliminate current. Ex-1002 ¶213.

A POSITA would have had a reasonable expectation of success in combining Rabu and Karam because both teach similar structures and components,

including a power source device (Ex-1005, Fig. 1 (Rabu's 14); Ex-1008, 3:41-43 (Karam's 24)), an electronic device (Ex-1005, Fig. 1 (Rabu's 12); Ex-1008, 3:41-43 (Karam's 26)), and a connector connecting a power source device and a portable electronic device (Ex-1005 ¶40 (Rabu's 16); Ex-1008, 3:41-43 (Karam's communications pathway 28)). Ex-1002 ¶214.

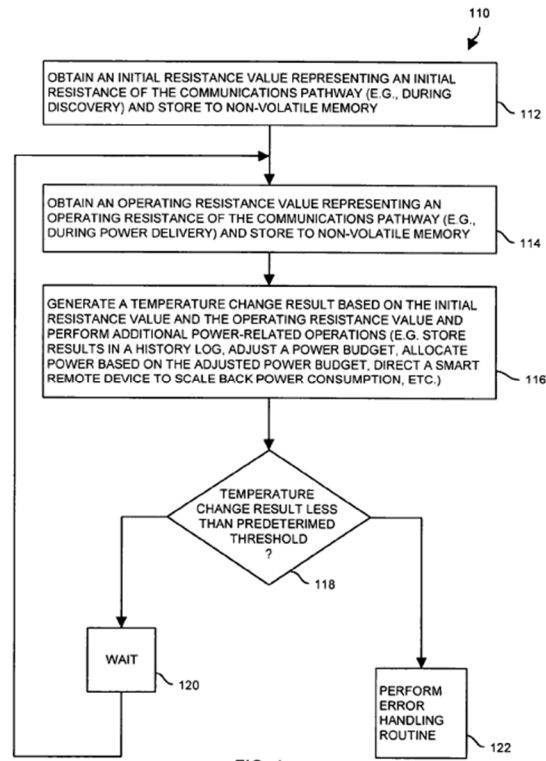
- b. Claim 3 - The method of claim 1, wherein said determining the change in temperature comprises: determining an ambient temperature at the first device; determining a temperature of a first connector of the connection; and determining the difference between the ambient temperature and the temperature of the first connector of the connection.**

Rabu and Karam teach the limitations of Claim 3. Ex-1002 ¶¶215-20.

As discussed in Section XII.A.2.b (for element 1[A]), Rabu teaches determining a temperature of a first connector of the connection. Rabu teaches that connector 38 may include "thermal protection circuitry 710," which "may include a temperature-sensitive device such as a temperature sensor." Ex-1005 ¶46, Fig. 7. A POSITA would have understood that a temperature sensor is typically used to determine an ambient temperature. Ex-1002 ¶216. Rabu explains that "circuitry 710 may include a temperature-sensitive fuse or other suitable device that changes state depending on ambient temperature." Ex-1005 ¶46, Fig. 7. A POSITA would have understood circuitry 710 can be used to determine an ambient temperature. Ex-1002 ¶216.

And Karam teaches determining the operational temperature of the cables by factoring in the measured temperature of the cables' ambient surroundings. Karam explains that "a sudden rise in ambient temperature of the building where the cable run is present on a hot summer day that contributes to the rise in the temperature of the cables can be factored in the decision and would help account for the operational temperature of the cables as dictated in their specifications." Ex-1008, 6:61-67. Karam discloses that in step 122 of Figure 4, performed by controller 88, "the ambient temperature is evaluated (assuming sensors are present) to analyze if the rise [of temperature] is due to environmental issues." *Id.* at 9:33-35. Karam also teaches generally reading temperature from different locations in a building to track the changes in ambient temperature. *Id.* at 6:52:56.

A POSITA would have been motivated to compare current cable temperatures to those general building ambient temperatures because the cables are housed inside of the building and their ambient surroundings (i.e., the building) affect their operating temperatures. A POSITA would have understood that the difference between the ambient temperature and temperature of the first connector is determined to assess whether the temperature rise is due to environmental influences (e.g., increased building temperature on a hot summer day) or due to internal electrical problems (e.g., a short causing heat buildup). Ex-1002 ¶218.



A POSITA would have been motivated to combine the teachings of Rabu and Karam because both are directed to methods for controlling current based on temperature of electronic devices. Ex-1005 ¶3; Ex-1008, 2:36-50. Ex-1002 ¶219. Further, both teach measuring the ambient temperature of electronic devices. Ex-1005 ¶46; Ex-1008, 9:33-35.

A POSITA would have a reasonable expectation of success in combining Rabu and Karam for the reasons discussed above in Section XII.C.4.a (for Claim 2). Ex-1002 ¶220.

- c. **Claim 4 - The method of claim 1, wherein said determining the change in temperature comprises: determining an initial temperature of a first connector of the connection at a first time; determining a current temperature of the first connector of the connection at a second time; and determining the difference between the initial temperature and the current temperature.**

Rabu and Karam teach the limitations of Claim 4. Ex-1002 ¶¶221-24.

Rabu discloses that if connector 38 exceeds a threshold temperature such as a threshold value “less than [] 85° C., 90° C., 95° C., 100° C., greater than 100° C., or any other suitable threshold temperature,” thermal protection circuitry 710 may be configured to shut off power. Ex-1005 ¶76. Thus, A POSITA would have understood Rabu to disclose determining a change in temperature. Ex-1002 ¶222.

Moreover, Rabu discloses shutting off power “only after the threshold temperature has been exceeded for a given time period.” Ex-1005 ¶76. A POSITA would have understood that Rabu teaches determining the temperature at two different times separated by a set time difference (e.g., 5 minutes). Ex-1002 ¶223. The first of such measurements would be the claimed “initial temperature ... at a first time” while the second measurement would be the claimed “current temperature ... at a second time.” *Id.* Rabu also discloses “determining the difference between the initial temperature and the current temperature” as Rabu seeks to determine a time period that the threshold temperature has been exceeded as a precondition to shutting off the power. *Id.*

Karam discloses the limitations of Claim 4 for the same reasons discussed in Section XII.C.2.b (for element 1[A]).

- d. Claim 5 - The method of claim 1, wherein said determining the change in temperature comprises: ... device.**

Rabu, Katayama, and Karam teach the limitations of Claim 5, for the same reasons discussed in Sections XII.A.4.a (for Claim 5) and XII.C.2.b-c (for elements 1[A] and 1[B]). Ex-1002 ¶225.

- e. Claim 6 - The method of claim 1, wherein said determining the change in temperature comprises: ... connection.**

Rabu, Katayama, and Karam teach the limitations of Claim 6, for the same reasons discussed in Sections XII.A.4.b (for Claim 6) and XII.C.2.b (for element 1[A]). Ex-1002 ¶226.

- f. Claim 7 - The method of claim 1, wherein said determining the change in temperature comprises: ... connection.**

Rabu, Katayama, and Karam teach the limitations of Claim 7, for the same reasons discussed in Section XII.C.4.e (for Claim 6). Ex-1002 ¶227.

- g. Claim 8 - The method of claim 1, wherein said reducing the current is performed by the first device.**

Rabu, Katayama, and Karam teach the limitations of Claim 8, for the same reasons discussed in Section XII.A.4.d (for Claim 8) and Section XII.C.2.f (for element 1[E]). Ex-1002 ¶228.

- h. Claim 10 - The device of claim 9, wherein said first logic is configured to: determine an ambient temperature at the first device; and determine the difference between the ambient temperature and the temperature of the first connector of the connection.**

Rabu and Karam teach the limitations of Claim 10, for the same reasons discussed in Section XII.C.4.b (for Claim 3). Ex-1002 ¶229.

- i. Claim 11 - The device of claim 9, wherein said first logic is configured to: determine an initial temperature of the first connector of the connection at a first time; determine a current temperature of the first connector of the connection at a second time; and determine the difference between the initial temperature and the current temperature.**

Rabu and Karam teach the limitations of Claim 11, for the same reasons discussed in Section XII.C.4.c (for Claim 4). Ex-1002 ¶230.

- j. Claim 12 - The device of claim 9, wherein said first logic is configured to: ... port.**

Rabu, Katayama, and Karam teach the limitations of Claim 12, for the same reasons discussed in Sections XII.A.4.e (for Claim 12) and XII.C.3.b-c (for elements 9[A] and 9[B]). Ex-1002 ¶231.

- k. Claim 13 - The device of claim 9, wherein said first logic is configured to: ... connection.**

Rabu, Katayama, and Karam teach the limitations of Claim 13, for the same reasons discussed in Section XII.A.4.f (for Claim 13) and XII.C.4.e-f (for Claims 6 and 7). Ex-1002 ¶232.

XIII. THE BOARD SHOULD NOT USE ITS DISCRETION TO DENY INSTITUTION UNDER *FINTIV*

The Board should decline to exercise its discretion to deny institution under 35 U.S.C. § 314(a). While Director Vidal’s June 21, 2022, Guidance made clear that “Fintiv is limited to facts of that case,” for completeness, Petitioner addresses the factors set forth in *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential). As explained below, the six factors set out in *Fintiv* do not justify denying institution.

The **first *Fintiv* factor** is neutral here because Samsung has not yet moved to stay the district court proceedings pending IPR, and the PTAB will not infer how the district court would rule should a stay be requested. *See, e.g., Hulu LLC v. SITO Mobile R&D IP, LLC et al.*, IPR2021-00298, Paper 11 at 10-11 (PTAB May 19, 2021).

For the **second *Fintiv* factor**, the district court has not set a trial date in the Samsung matter. Speculating based on prior practice in Judge Gilstrap’s Court, the earliest estimated trial date is approximately October 2024. Even if trial proceeds in October 2024, the above timing does not tip in favor of denying the petition in this case. *See, e.g., Apple Inc. v. Koss Corp.*, IPR2021-00305, Paper 14 at 13 (PTAB June 3, 2021). This Petition is filed in January 2023. An institution decision should be issued within six months of docketing, around July 2023. And a final written decision (FWD) should be issued in July 2024. Thus, the ***earliest***

estimated trial date thus several months after the FWD. Recent PTAB cases analyzing similar schedules have weighed the second factor as neutral or, at most, slightly in favor of denial. *See, e.g., Google LLC et al. v. Parus Holdings, Inc.*, IPR2020-00847, Paper 9 at 12 (PTAB Oct. 21, 2020) (trial scheduled for three months before FWD weighs “at best, neutral”); *Apple Inc. v. Koss Corp.*, IPR2021-00305, Paper 14 at 13-14 (PTAB, June 3, 2021) (trial scheduled for two months before FWD weighs “at most, minimally in favor” of denial).

On the other hand, if the median time to trial for civil actions in the Eastern District of Texas is used to estimate the trial date, as advised by Director Vidal’s June 2022 Guidance, trial should not be expected to occur until December 2024, again several months *after* a FWD will issue, Ex-1017, at 35 (indicating a most-recent median time to trial for civil actions in the Eastern District of Texas of 24.5 months).

The **third *Fintiv* factor** weighs strongly against denial. Samsung has not yet answered Polaris’s Complaint. No hearing has been set and no substantive activity has occurred in the case. The Case Management Conference is expected to be set no earlier than March 2024. Because the investment in the parallel proceeding by the court has been minimal and Petitioner acted diligently, this factor weighs strongly against discretionary denial. *See, e.g., Hulu*, Paper 11 at 13.

The **fourth *Fintiv* factor** also weighs against denial. As explained above, the median time to trial for civil actions in the Eastern District of Texas suggests that trial will not occur until at least a month after a FWD is issued. Thus, “there is a reasonable likelihood that the Board will address the overlapping validity issues prior to the district court reaching them at trial..., thereby providing the possibility of simplifying issues for trial.” *Juniper Networks, Inc. v. Packet Intelligence LLC*, IPR2020-0039, Paper 21 at 18 (PTAB Sept. 10, 2020); *see also MED-EL Elektromedizinische Geraete GmbH v. Sonova AG*, IPR2020-00176, Paper 13 at 15 (PTAB June 3, 2020) (“As to the fourth factor, the parties do not dispute that overlap exists between the invalidity issues in this case and in the district court. This overlap may inure to the district court’s benefit, however, by simplifying issues for trial should we reach our determination on the challenges raised in the Petition before trial.”).

Moreover, Petitioner is challenging more claims than what is likely to be asserted in the district court litigation. Patent Owner’s Complaint identifies only independent claim 9. *Polaris PowerLED Techs., LLC v. Samsung Elecs. Am., Inc.*, No. 2:22-cv-00469, Dkt. 1 ¶75 (E.D. Tex. Dec. 12, 2022). In the district court, PO will likely assert a subset of claims, while this Petition challenges all claims of the ’456 Patent. This IPR petition is thus the only venue in which these invalidity challenges will be adjudicated against several claims in the ’456 Patent, which

promotes system efficiency and benefits the public in that many more claims will be addressed here and will resolve disputes against future district court defendants. *See Fintiv*, Paper 11 at 4 (“the Board’s cases addressing earlier trial dates as a basis for denial under NHK have sought to balance considerations such as system efficiency, fairness, and patent quality.”). Accordingly, challenging additional claims further weighs against denial. *See, e.g., Vudu, Inc. v. Ideahub, Inc.*, IPR2020-01688, Paper 16 at 14-15 (PTAB Apr. 19, 2021) (“differences in asserted claims” and claims challenged in the petition weighs against denial).

On the **fifth *Fintiv* factor**, the Board should give little weight to the fact that Petitioner and PO are the same parties as in district court. *See Weatherford U.S., L.P., v. Enventure Global Tech., Inc.*, Paper 16 at 11-13 (Apr. 14, 2021). Although Samsung is both petitioner and litigation defendant, this factor does not outweigh the other factors that strongly weigh against discretionary denial.

“Other circumstances” under the **sixth *Fintiv* factor** further weigh against discretionary denial. The merits of the Petition are strong. Here, Rabu alone renders obvious nearly all ’456 Patent claims, with Katayama and Shoji added simply to demonstrate the obvious feature that temperatures are measured at both devices and compared. Karam is added to the extent that the claims are understood to include a specific temperature change calculation. All elements recite nothing more than predictable approaches to measuring temperature and protecting

electronic devices from damage caused by overheating as explained by the prior art and are well within a POSITA's skill and knowledge. *See Align Tech., Inc. v. 3Shape A/S*, IPR2020-01087, Paper 15 at 42-43 (PTAB Jan 20, 2021). See also Section VII above.

Taken together holistically, the *Fintiv* factors strongly weigh against denial.

XIV. CONCLUSION

The unpatentability grounds presented above are reasonably likely to prevail, *inter partes* review should be instituted, and Claims 1-13 should be cancelled as unpatentable over the prior art.

Respectfully Submitted,

/s/ Ben Haber
Ben Haber (Reg. No. 67,129)

CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), Petitioner certifies that this petition includes 13,952 words, as measured by Microsoft Word, exclusive of the table of contents, mandatory notices under § 42.8, certificates of service, word count, and exhibits.

CERTIFICATE OF SERVICE (37 C.F.R. § 42.6(e)(1))

The undersigned certifies pursuant to 37 C.F.R. §§42.6(e) and 42.105 that on January 26, 2023, a true and correct copy of the Petition for *Inter Partes* Review of U.S. Patent No. 8,740,456 and Exhibits 1001 through 1027 were served via express mail on the Patent Owner at the below correspondence address of record:

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