UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE, INC.,	:	
	:	Case No.
Petitioner,	:	IPR2024-00697
	:	U.S. Patent No. 8,093,767
vs.	:	
	:	Case No.
RESONANT SYSTEMS, INC.,	:	IPR2024-00698
	:	U.S. Patent No. 8,093,767
Patent Owner.	:	
_____	x	

DEPOSITION OF BLAKE HANNAFORD, Ph.D.

Via Zoom Videoconference

Monday, June 23, 2025

Stenographically Reported by:
JUSTYNE N. JOHNSON
RPR, CSR. No. 14301

Job No. 589690

Pages 1-43

The Deposition of BLAKE HANNAFORD, Ph.D. was taken on behalf of Patent Owner, all parties appearing remotely via Zoom videoconference, beginning at 9:36 a.m., Pacific time, on June 23, 2025, before JUSTYNE JOHNSON, RPR, Certified Shorthand Reporter No. 14301.

1 APPEARANCES:
2
3 FOR PATENT OWNER
4 RUSS, AUGUST & KABAT
5 BY: NEIL RUBIN, ESQ.
6 Attorney at Law
7 12424 Wilshire Boulevard
8 12th Floor
9 Los Angeles, California 90025
10 Nrubin@raklaw.com
11
12
13 FOR PETITIONER
14 FISH & RICHARDSON, PC
15 BY: CRAIG DEUTSCH, ESQ.
16 Attorney at Law
17 60 South Sixth Street
18 Suite 3200
19 Minneapolis, Minnesota 55402
20 Deutsch@fr.com
21
22
23
24
25

1 INDEX

2 WITNESS EXAMINATION

3 BLAKE HANNAFORD

4 BY MR. RUBIN.....7

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

1 EXHIBITS
2 (None)
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

June 23, 2025 | 9:36 a.m.

THE STENOGRAPHER: Good morning. We are going on the record at 9:36 a.m. on Monday, June 23, 2025, in the matter of Apple, Inc., v. Resonant Systems, Inc., Case Numbers IPR2024-00697 and IPR2024-00698. Today's deposition is taking place remotely via Zoom videoconference.

My name is Justyne Johnson. I am a California certified shorthand reporter representing the firm Planet Depos, and my certification number is 14301. The deponent is Blake Hannaford, Ph.D., and is located in Seattle, Washington.

Counsel, can you please introduce yourselves.

MR. RUBIN: Good morning. This is Neil Rubin of Russ, August & Kabat representing the patent owner of Resonant Systems, Inc.

MR. DEUTSCH: And this is Craig Deutsch of Fish & Richardson representing Petitioner Apple, Inc.

THE STENOGRAPHER: Dr. Hannaford, can you raise your right hand, please?

///

///

///

1 BLAKE HANNAFORD,
2 having first been sworn by the Certified Shorthand
3 Reporter, was examined and testified as follows:
4 THE WITNESS: I do.
5 THE STENOGRAPHER: Go ahead, Counsel.
6 MR. RUBIN: Thank you.
7
8 EXAMINATION
9 BY MR. RUBIN:
10 Q Good morning, Dr. Hannaford.
11 A Good morning, Mr. Rubin.
12 Q So you've been deposed previously in these
13 matters; correct?
14 A That's right.
15 Q And you're familiar with the deposition process,
16 I take it?
17 A Yes.
18 Q So, I guess, to save us time, I won't go over the
19 ground rules again unless you have any questions about the
20 process.
21 A I don't have any questions.
22 Q Is there any reason today that you cannot give a
23 full and complete -- or withdrawn. Let me start that
24 over.
25 Is there any reason today you cannot give

1 complete and accurate testimony?
2 A No.
3 Q Are you suffering from any illness or taking any
4 medication that would affect your memory or ability to
5 answer questions?
6 A I am not.
7 Q So today, we're here to address two IPRs
8 concerning Apple's -- I'm sorry, two IPRs concerning
9 Resonant Systems' '767 patent. You're aware of that?
10 A Yes.
11 Q And in those two IPRs, you've submitted
12 supplemental declarations that were signed May 28th of
13 this year; is that right?
14 A I don't -- my -- I have an unmarked copy with me,
15 and I don't recall the exact date. But certainly that's
16 about right.
17 Q Okay. Do the -- wait. You referred to it as an
18 "unmarked copy." I take it you probably have copies of
19 two different declarations with you?
20 A I have printouts of the '697 and also the '698,
21 the declarations on the '767 patent.
22 Q Okay. And do those declarations each bear the
23 title "Supplemental Declaration of Blake Hannaford,
24 Ph.D."?
25 A Yes.

1 Q And do those have exhibit numbers stamped at the
2 bottom of the first page saying "Apple" --
3 A Not my copy, no.
4 Q Okay. And on the last page of each of those
5 declarations, is there the date 28 May 2025?
6 A No.
7 Q Okay.
8 A These are copies without the signature or date.
9 Q Okay. So, I guess, before I go into further
10 detail on the printed copies that you have, what the
11 declarations are, are there any other printed materials
12 that you have with you --
13 A No.
14 Q -- made for the deposition?
15 And are there any electronic copies of documents
16 that you have with you for use in the deposition today?
17 A No.
18 Q For the declaration in the IPR with number ending
19 in '697, what's the page number on the last page of the
20 copy you have?
21 A Twenty-eight.
22 Q And is there any text on page 28?
23 A Only a signature line with my name under it and a
24 date field, which are not signed.
25 Q I see. And then same question for the

1 declaration in the IPR ending in '698.
2 A The last page I have is 31.
3 Q And I take it that there is a blank line meant to
4 indicate the date and a blank signature line with your
5 name printed underneath it?
6 A That is correct.
7 Q But the printed copies that you have in front of
8 you, you understand those to be identical to the co- --
9 the versions that you signed and that were submitted in
10 the --
11 A Yes. To the best of my knowledge, those are
12 identical.
13 MR. RUBIN: So I'm going to upload, using the
14 Zoom chat function, electronic copies that I have of the
15 declarations as they were filed at the PTAB. And in case
16 there's any issue as to what the final declaration as
17 filed contained, you can feel free to consult those
18 electronic copies.
19 BY MR. RUBIN:
20 Q Are you able to download those in Zoom?
21 A I see '698 right now. Yes. I can download those
22 to my desktop. Or actually, I'll pull them in my
23 downloads folder. That's where I'm going to do that.
24 So '698 is here, but I do not see '697.
25 Q Hm. That's interesting. I --

1 MR. RUBIN: Mr. Deutsch, do you see two different
2 documents in the chat window there?
3 MR. DEUTSCH: I do. Looks like '697 came in
4 first and then '698.
5 THE WITNESS: Oh, I see. Sorry. There was a
6 pop-up that was just blocking the first one. And now I
7 get '697. That was -- that's a little bug in Zoom. I
8 have them both. Thank you.
9 MR. RUBIN: And then while we're downloading
10 things, I will also share with the chat function two
11 documents that Apple submitted as Exhibit 1051 and
12 Exhibit 1052 in each of the two IPRs.
13 THE STENOGRAPHER: Counsel, I need to go off the
14 record.
15 MR. RUBIN: All right.
16 THE STENOGRAPHER: Off the record at 9:45.
17 (Off the record.)
18 THE STENOGRAPHER: Back on the record at
19 9:48 a.m.
20 Go ahead, Counsel.
21 MR. RUBIN: Yeah, sorry.
22 Can we go off the record for just a minute?
23 THE STENOGRAPHER: Off the record at 9:48 a.m.
24 (Off the record.)
25 THE STENOGRAPHER: Back on the record at

1 9:48 a.m.
2 Go ahead, Counsel.
3 BY MR. RUBIN:
4 Q So, Dr. Hannaford, were you able to download the
5 Exhibit 1051 and Exhibit 1052 that I have uploaded in the
6 chat?
7 A Yes. I have a total of four now.
8 Q So Exhibit 151 [sic] and Exhibit 152 [sic] were
9 each filed by Apple in each of the two IPRs concerning the
10 '767 patent. The copies that I uploaded are the copies
11 filed in the '897 IPR. But should be the same as what was
12 filed in the 89- -- I'm sorry, the '698 IPR.
13 So if I can have you turn to page 7 of your
14 declaration in the '697 IPR.
15 Are you there?
16 A Okay.
17 Q And starting at paragraph 8, you -- well, I
18 guess, starting in paragraph 7, you offer some opinions
19 about whether Shahoian and Cosper are analogous are -- you
20 see that?
21 A Yes.
22 Q And in particular, you offer some opinions about
23 what the field of endeavor is for the '767 patent.
24 Do you recall that?
25 A Yes.

1 Q In paragraph 9, you quote from the '767 patent
2 its description of its, quote, "technical field."
3 Do you see that?
4 A I see paragraph 9, yes.
5 Q Is it your opinion that that quoted language from
6 the '767 patent identifies the patent's field of endeavor?
7 MR. DEUTSCH: Objection. Form.
8 THE WITNESS: Well, it's certainly clear that it
9 describes the technical field. And I don't know if
10 there's a legal difference between "field of endeavor" and
11 "technical field." But in my opinion, they are the same
12 thing.
13 BY MR. RUBIN:
14 Q In the first sentence of paragraph 10, you say,
15 "Shahoian and Cosper each fall within this field of
16 endeavor."
17 Do you see that?
18 A I see that sentence.
19 Q And when you refer to, quote, "this field of
20 endeavor," are you referring to the language you quoted
21 from the '767 patent in paragraph 9?
22 A Yes.
23 Q So would you agree that your opinion that
24 Shahoian and Cosper fall within the field of endeavor of
25 the '767 patent is based on your determination that those

1 references fall within the field described in the language
2 you quote in paragraph 9?
3 MR. DEUTSCH: Objection. Form and scope.
4 THE WITNESS: I -- my opinion, I think, is stated
5 clearly in paragraph 9. And in particular, they -- the
6 references belong to a wide variety of different types of
7 electromechanical devices and systems and produce
8 vibrations.
9 BY MR. RUBIN:
10 Q As you understand the technical field of the '767
11 patent, would it include technology for measuring the
12 response of the ground or a structure to an earthquake?
13 MR. DEUTSCH: Objection. Scope.
14 THE WITNESS: That's not stated in my
15 paragraph 9, if that's what you mean -- if that's what
16 your question means.
17 BY MR. RUBIN:
18 Q Would the field of endeavor in the up -- I'm
19 sorry. Withdrawn.
20 In your opinion, does the field of endeavor of
21 the '767 patent include civil engineering?
22 MR. DEUTSCH: Objection. Scope.
23 THE WITNESS: I have no opinion about civil
24 engineering in the report -- in the declaration -- in
25 the -- I'll -- to be most precise, in the supplemental

1 declaration.
2 MR. RUBIN: I'll share my screen, Exhibit 1051,
3 which I previously shared a copy of with you.
4 (Exhibit 1051, page 1, was displayed.)
5 BY MR. RUBIN:
6 Q Do you recall citing from this dictionary in your
7 declaration?
8 A Yes.
9 Q And you'd agree, from the title page, that this
10 Exhibit 1051 is excerpts from The New Penguin Dictionary
11 of Civil Engineering?
12 A I agree with that. Yes.
13 (Exhibit 1051, page 3, was displayed.)
14 BY MR. RUBIN:
15 Q Turning to the last page of the exhibit, do you
16 recall citing to this dictionary -- its definition of
17 "accelerometer"?
18 A I do.
19 Q Now, is this a dictionary that you, personally,
20 have a copy of?
21 A I do not.
22 Q Is it a dictionary that you have ever consulted
23 in your professional work?
24 A Not that I recall.
25 Q Looking at the first sentence of the definition

1 of "accelerometer," it reads, quote, "A sensor for
2 measuring acceleration used, e.g., to measure the response
3 of the ground or a structure to an earthquake."
4 Do you see that?
5 A I see that. Yes.
6 Q You would agree that sensors used to measure the
7 response of the ground or a structure to an earthquake are
8 not within the technical field of the '767 patent;
9 correct?
10 MR. DEUTSCH: Objection. Scope.
11 THE WITNESS: I believe accelerometers are within
12 the technical field of the '767 patent. And I interpret
13 the sentence you just highlighted or pointed -- pointed me
14 to, I interpreted that sentence as defining
15 "accelerometer" as a sensor for measuring acceleration.
16 And then followed in that same sentence by an example
17 given in this dictionary.
18 But acceleration is a fundamental physical
19 quantity that accelerometers measure, as the roots of the
20 word "accelerometer" suggest. And it's understandable
21 that a civil engineering dictionary would choose an
22 example pertinent to civil engineering. But accelero- --
23 acceleration is fundamental to all movement, all vibration
24 of any type.
25 ///

1 BY MR. RUBIN:
2 Q Are you familiar with the concept of "proper
3 acceleration"?
4 A I'm sorry. Which kind of acceleration?
5 Q Proper acceleration.
6 A Proper?
7 MR. DEUTSCH: Objection. Scope.
8 THE WITNESS: I am not familiar with the concept
9 of "proper acceleration."
10 MR. RUBIN: Okay.
11 BY MR. RUBIN:
12 Q So if I were to tell you that by "proper
13 acceleration," I meant acceleration of an object relative
14 to an observer in an inertial frame of reference, would
15 you understand what that means?
16 MR. DEUTSCH: Objection. Form.
17 THE WITNESS: I would understand that, I think.
18 BY MR. RUBIN:
19 Q Or put another way, if I said that by "proper
20 acceleration," I meant acceleration of an object relative
21 to an observer that's in free fall, would you understand
22 what I mean?
23 MR. DEUTSCH: Objection. Form and scope.
24 THE WITNESS: I have to think about it and make
25 sure I agree with those two -- that those -- I assume

1 you're implying that those are two ways of saying the same
2 def- -- the same thing, not two contrasting definitions of
3 proper. Is that correct?
4 BY MR. RUBIN:
5 Q I think they're two different ways of saying the
6 same thing but --
7 A I hope so.
8 Q You -- you may or may not agree.
9 A But I know what is meant by an observer --
10 relative to an observer in free fall.
11 Q So relative to an observer in free fall, you,
12 sitting in your chair in your office there, are
13 accelerating at what in physics is usually denoted with a
14 "g" approximately 9.8 meters per second squared; is that
15 right?
16 A Don't quote me on the second digit of G, but I
17 agree with that in principle, yes.
18 Q Now, the petitioner here, Apple, sells, among
19 other things, the iPhone; correct?
20 A I have heard of that product, yes.
21 Q Okay. And do you own an iPhone?
22 A I do not own an iPhone.
23 Q Do you know whether iPhones or competing
24 smartphone devices have accelerometers in them?
25 MR. DEUTSCH: Objection. Scope.

1 THE WITNESS: As far as I know, every phone
2 that's commonly called a smartphone does contain an
3 accelerometer.
4 BY MR. RUBIN:
5 Q And is one of the things that accelerometer is
6 used for determining the orientation of the device?
7 A That is a common --
8 MR. DEUTSCH: Objection. Form and scope.
9 MR. RUBIN: I'm sorry. Your answer, I think, was
10 cut off. What was the answer?
11 THE WITNESS: Maybe just repeat the question to
12 be sure.
13 BY MR. RUBIN:
14 Q The question was: Is one of the things that
15 accelerometer is used for determining the orientation of
16 the device?
17 MR. DEUTSCH: Same objections.
18 THE WITNESS: Yes.
19 BY MR. RUBIN:
20 Q And imagine that a smartphone with an
21 accelerometer like we've been discussing is sitting on the
22 desk in front of you.
23 A And one is actually -- yes.
24 Q Okay. So the accelerometer -- even though the
25 phone is sitting on the desk and at rest relative to the

1 desk, the accelerometer inside of it is measuring an
2 acceleration because of the gravitational force that it's
3 experiencing; correct?
4 MR. DEUTSCH: Objection. Form and scope.
5 Incomplete hypothetical.
6 THE WITNESS: That is my understanding, yes.
7 BY MR. RUBIN:
8 Q So at least for the accelerometer in the
9 smartphone on the desk in front of you, it's measuring
10 acceleration not relative to the desk that it's sitting on
11 top of, but relative to an observer that was in free fall?
12 MR. DEUTSCH: Objection. Form. Objection.
13 Scope.
14 THE WITNESS: I think that's a correct statement.
15 (A document was displayed.)
16 MR. RUBIN: So you should see on the screen now
17 Exhibit 1052, which I also uploaded in the chat.
18 (Exhibit 1052, page 1, was displayed.)
19 BY MR. RUBIN:
20 Q Do you see that?
21 A I see it. Yes. I see the number on the tab --
22 oh, I see the number at the bottom of the page too.
23 Q Great. And so the first page here is the title
24 page of Collins Dictionary of Electronics: Definitions
25 for the Digital Age. Would you agree?

1 A I see that.
2 (Exhibit 1052, page 2 and 3, was displayed.)
3 BY MR. RUBIN:
4 Q On the last page at the top of the page, there's
5 a definition of "accelerometer." Do you recall citing
6 this definition in your declarations?
7 (Stenographer clarification.)
8 BY MR. RUBIN:
9 Q On the top of the last page of this exhibit,
10 there's a definition of accelerometer. Do you recall
11 citing this definition in your declarations?
12 A Yes.
13 Q I'll read that definition. Quote, "A device that
14 senses or measures the acceleration applied to it usually
15 with an electrical output."
16 Do you see that?
17 A Yes.
18 Q So you would agree that, at least according to
19 this definition, an accelerometer is something that senses
20 an acceleration applied to the accelerometer itself;
21 correct?
22 MR. DEUTSCH: Objection. Form.
23 THE WITNESS: I see that -- I see "acceleration
24 applied to it" as written in the declara- -- the
25 definition, yes.

1 BY MR. RUBIN:
2 Q So would you agree that the smartphone on your
3 desk that we were talking about and the accelerometer
4 inside it, that accelerometer is measuring the
5 accelero- -- acceleration applied to the accelerometer
6 itself?
7 MR. DEUTSCH: Objection. Scope and form.
8 THE WITNESS: It's measuring the acceleration of
9 gravity and gravity certainly applies to the phone.
10 BY MR. RUBIN:
11 Q Now, if I wanted to measure an acceleration of an
12 object, are there ways that I can measure the acceleration
13 of that object without using a sensor that is, itself,
14 experiencing that same acceleration?
15 MR. DEUTSCH: Objection. Form and scope.
16 THE WITNESS: I think I would have to think about
17 that, actually.
18 BY MR. RUBIN:
19 Q Why do you say you'd have to think about it?
20 A Did you say why did I say I'd have to think about
21 it? Sorry. I'm --
22 Q Yeah. That's --
23 A -- just trying to --
24 Q -- my question. And I'm sorry if maybe -- sounds
25 like there's some difficulty understanding my audio. Let

1 me adjust.
2 A No. I just wanted to confirm it.
3 I would have to think about it because you asked
4 me if there's any way to sense acceleration that -- any
5 device which can sense acceleration without accelerating
6 itself. And I said I'd have to think about that because
7 that encompasses any possible sensor, and I'd have to
8 analyze different sensors to see if, A, they could measure
9 acceleration; and, B, if they would, in fact, be
10 accelerated themselves.
11 So, for example, is it possible to measure the
12 acceleration of an object by bouncing a beam of light off
13 of it? And that sensor would not be located on the object
14 itself. But I don't have an opinion if that's possible or
15 not because it requires some analysis.
16 Q So now you'd agree that you could measure the
17 velocity of an object by bouncing light off the object;
18 right?
19 MR. DEUTSCH: Objection. Form and scope.
20 THE WITNESS: There is a phenomenon called the
21 Doppler shift, which could be exploited to do that.
22 BY MR. RUBIN:
23 Q And so using the phenomenon of Doppler shift, you
24 could measure how the wavelength of light reflected off
25 the object differed from the wavelength of light that

1 was -- before it reflected off the object, and based on
2 that difference, you could figure out the relative
3 velocity of the object; correct?
4 MR. DEUTSCH: Objection. Form. Incomplete
5 hypothetical.
6 THE WITNESS: Again, I don't want to sit here and
7 form an opinion that requires analysis right now in the --
8 during the deposition. But on a casual basis, I would
9 agree with you.
10 BY MR. RUBIN:
11 Q And if you imagined that you measured the change
12 in that wavelength shift as a function of time, would that
13 tell you how the object was accelerating?
14 MR. DEUTSCH: Objection. Form and scope.
15 THE WITNESS: Again, without taking the time to
16 form a formal opinion, the change in velocity can give you
17 the acceleration if you -- if -- in conjunction with the
18 time interval over which that change occurs.
19 MR. RUBIN: I'm going to upload another exhibit.
20 This is Exhibit 1009 in the IPR ending in '697.
21 THE WITNESS: I have pulled it up.
22 MR. RUBIN: All right. And then you should also
23 see it on the screen.
24 (Exhibit 1009, page 1, was displayed.)
25 ///

1 BY MR. RUBIN:
2 Q This is a --
3 A I see it on the screen as well.
4 Q Okay. So this is the Cosper patent -- or I
5 should say the Cosper patent application. I'm sure you
6 recall offering opinions about this exhibit?
7 A I do.
8 (Exhibit 1009, page 26, was displayed.)
9 BY MR. RUBIN:
10 Q So turning to paragraph 9 of Cosper, which you
11 should see on the screen, the last sentence of that
12 paragraph reads, quote, in one system, the systems -- I'm
13 sorry. Let me start over.
14 The last sentence of paragraph 3 reads, quote,
15 "In one example, the systems are described for use with
16 elimination systems including a" oscillating resonant
17 assisted -- "oscillating resonant engine."
18 Do you see that?
19 A I do.
20 Q You would agree that there's no example in Cosper
21 of applying its teachings to a system other than an
22 elimination system?
23 A Well, I guess I would have --
24 MR. DEUTSCH: Objection. Form.
25 THE WITNESS: Sorry. I'll start over.

1 I guess I would have to check that -- all the
2 examples in Cosper. I don't remember. I looked at it
3 with respect to systems and methods for control of mass
4 and bias subassembly, including oscillating mechanical
5 systems. So as described in that same paragraph, that's
6 what I was looking for.
7 We could go through the figures. I just don't
8 recall either way if there were other examples given.
9 Q Okay. How about we go through the figures? And
10 you can go through your local copy, I guess.
11 A Yeah. I'm scanning them right now.
12 (Exhibit 1009, page 2, was displayed.)
13 THE WITNESS: There's several figures which don't
14 show optical elements like 14A and B and C, which shows
15 springs and masses but don't show optical elements at all
16 and, you know, really talk about resonating spring mass
17 and damping systems or describe and -- with an actuator.
18 So I -- you know, those are examples.
19 (Exhibit 1009, page 16, was displayed.)
20 MR. RUBIN: Figure 12, figure 11.
21 (Exhibit 1009, page 14, was displayed.)
22 BY MR. RUBIN:
23 Q Are you able to see my screen shared right now or
24 has that gone away?
25 A Not right now.

1 Q All right.
2 A But I do have that referenced up on my -- on
3 another window right now. It was up -- your screen was
4 shared just up to a moment ago.
5 Q Thank you.
6 So staying at Exhibit 1009, the Cosper reference,
7 you see paragraph 3, which we were just talking about,
8 refers to systems, quote, "that operate in an oscillatory
9 mode at or near their mechanical resonant frequency."
10 Do you see that?
11 A I do see that.
12 Q And lower on the -- that same page, paragraph 7,
13 the first sentence reads, quote, "Driving a mechanical
14 resonant system for low loss and a high Q at or near its
15 resonant frequency using an external frequency" --
16 references -- "may require a highly stable frequency
17 source."
18 Do you see that?
19 A I see that.
20 Q Turning to the next paragraph, the first sentence
21 reads, "Accordingly, it may be desirable to incorporate
22 feedback into such systems to eliminate the need for a
23 secondary external frequency source such that the natural
24 frequency of the mechanical resonant system becomes the
25 frequency reference."

1 Do you see that?
2 A I see that.
3 Q And the next sentence reads, quote, "Any
4 variation in the mechanical resonant system that affects
5 its resonant frequency is sensed and tracked by a
6 controller so that the mechanical resonant system is
7 driven and continues to oscillate at the near resonant
8 frequency."
9 Do you see that?
10 A I do.
11 Q So in paragraph 7, Cosper specifically refers to
12 driving a mechanical resonant system with a, quote,
13 "high Q" -- sorry. Paragraph 7 of Cosper recor- -- refers
14 to driving a mechanical resonant system with a, quote,
15 "high Q."
16 You would agree?
17 A Yes, I see that.
18 Q And it talks about when the system has a high Q,
19 the importance of driving the system at a frequency that
20 is close to the resonant frequency; correct?
21 MR. DEUTSCH: Objection. Form.
22 THE WITNESS: Sorry. Could you restate the
23 question? I just want to answer it accurately.
24 BY MR. RUBIN:
25 Q So you would agree that Cosper talks about the

1 importance of driving a system at a frequency that is
2 close to its resonant system when that system has a
3 high Q?
4 MR. DEUTSCH: Objection. Form.
5 THE WITNESS: Yeah. I mean, I don't see the word
6 "importance." You may be referring to the last sentence
7 where it -- you know, it's a significant change if there's
8 a difference between the two frequencies.
9 BY MR. RUBIN:
10 Q So that last sentence refers to relatively small
11 variations in frequency causing the amplitude to decrease
12 significantly. That's something that's true if the system
13 has a high Q value; correct?
14 MR. DEUTSCH: Objection. Form and scope.
15 THE WITNESS: But yeah. That is correct.
16 BY MR. RUBIN:
17 Q And in a system that has a low Q value,
18 relatively small variations in frequency will not cause a
19 significant decrease in amplitude; correct?
20 MR. DEUTSCH: Objection. Form and scope.
21 THE WITNESS: I would say it will change and
22 reduce the amplitude of oscillations.
23 BY MR. RUBIN:
24 Q When will --
25 A I (indiscernible) --

1 Q -- (indiscernible) reduce?
2 A I misstated my answer. I'm sorry.
3 With a low Q, the change in amplitude will be
4 smaller. Instead of decrease significantly, it will
5 change less. I guess -- I don't want to say, though, that
6 the decrease -- well, significance depends on -- on your
7 application. But it will decrease less if the Q is less.
8 That is true.
9 Q And would you agree that there's an inverse
10 relationship between the Q of a mechanical system and its
11 bandwidth?
12 MR. DEUTSCH: Objection. Form and scope.
13 THE WITNESS: I would slightly amend that and
14 then agree that there's an inverse relationship between
15 the Q of a resonant mechanical system and the bandwidth of
16 that same resonant mechanical system. There could be a
17 mechanical system that has other components that form its
18 total bandwidth. But for a system composed of a spring
19 mass and damper, I would agree to your statement.
20 BY MR. RUBIN:
21 Q And so for a mechanical resonant system -- saying
22 that it has a high Q is equivalent to saying that it has a
23 low bandwidth, and vice versa, saying it has a low Q is
24 saying it has a high bandwidth?
25 MR. DEUTSCH: Objection. Form and scope.

1 THE WITNESS: Yes.
2 MR. RUBIN: I've just uploaded another exhibit in
3 the chat function. This is Exhibit 1004 from the IPR
4 ending in '697.
5 BY MR. RUBIN:
6 Q Are you able to download that?
7 A Yes, I have that. I have it open.
8 Q Very good.
9 You should see Exhibit 1004 shared on my screen.
10 (Exhibit 1004, page 1, was displayed.)
11 THE WITNESS: I see that.
12 BY MR. RUBIN:
13 Q And so this is the '696 patent to Shahoian.
14 (Exhibit 1004, page 10, was displayed.)
15 BY MR. RUBIN:
16 Q So here on page 10 of the exhibit in column 4...
17 sorry. Give me a second.
18 (Exhibit 1004, page 9, was displayed.)
19 BY MR. RUBIN:
20 Q All right. So on top of column 2, the first
21 paragraph, second sentence reads, quote, "The present
22 invention provides actuators that output high-magnitude,
23 high-bandwidth vibrations for more compelling force
24 effects."
25 Do you see that?

1 A I see that.
2 Q And then starting at line 61 in column 2, "Both
3 the frequency and amplitude of the vibrations can be
4 controlled using bi-directional control, and features such
5 as the elastic material and flexures contribute to a high
6 quality and high bandwidth vibration force output."
7 Do you see that?
8 A Yes.
9 Q So for the mechanical features such as the
10 "elastic material and flexures to contribute to a high
11 bandwidth vibration force output," would you agree that
12 they would need to be contributing to a low Q value?
13 MR. DEUTSCH: Objection. Form and scope.
14 THE WITNESS: To the extent that bandwidth --
15 that a high bandwidth corresponds to a low Q and to the
16 extent that that high bandwidth is -- well, the issue is
17 high compared to what. But it's still -- it's a physical
18 fact that when they say "high bandwidth," they could also
19 say, "low Q."
20 BY MR. RUBIN:
21 Q And in your declarations in the executaries, you
22 don't point to anything in the Shahoian reference
23 suggesting that it's teaching use with a high Q resonant
24 system; correct?
25 MR. DEUTSCH: Objection. Form.

1 THE WITNESS: I think the essence of my opinion
2 is that Shahoian and Cosper are in the same field of
3 endeavor and their analogous art to '767.
4 BY MR. RUBIN:
5 Q But in offering that opinion, you don't offer any
6 evidence from Cosper suggesting that it's meant to be used
7 with systems with a low Q, and you don't cite to any
8 evidence from Shahoian suggesting it's meant to be used
9 with systems with a high Q; correct?
10 MR. DEUTSCH: Objection. Form.
11 THE WITNESS: Well, I mean, I guess I'd have
12 to -- I'd have to read, you know, everything here to be
13 sure of that answer. Sorry. Say the -- say the two parts
14 of that question again so I have it clear.
15 BY MR. RUBIN:
16 Q So in offering the opinions that you offer in
17 your declarations that Shahoian and Cosper are in the same
18 field of endeavor and, therefore, analogous art to the
19 '767 patent, you don't present any evidence from Cosper
20 suggesting it's meant to be used in systems with a low Q,
21 and you don't cite to any evidence from Shahoian
22 suggesting it's meant to be used with systems with a high
23 Q; correct?
24 MR. DEUTSCH: Objection. Form.
25 THE WITNESS: I -- it's my opinion that

1 systems -- both systems with a high Q and a low Q are
2 vibration-generating devices that can be incorporated into
3 different types of electromechanical devices to provide --
4 you know, to produce vibrations of selected amplitude and
5 frequency as in the '767 patent. And I don't see that --
6 I didn't see -- I did not compare the Q values between
7 those different types of electromechanical devices that
8 produce vibrations.
9 MR. RUBIN: How about we take a break?
10 THE STENOGRAPHER: Off the record at 10:46 a.m.
11 (Off the record.)
12 THE STENOGRAPHER: We are back on the record at
13 11:00 a.m.
14 BY MR. RUBIN:
15 Q All right. I'd like to turn to your discussions
16 of culminations including the Rossi reference. So if you
17 could please take a look at your declaration from the --
18 that is your supplemental declaration from the '897 IPR.
19 A I think you mean '697, but yeah.
20 Q I do mean '697. Thank you.
21 A I've been -- I've tried to compile a spreadsheet
22 of all these numbers. It's -- working on all of them
23 simultaneously, there are a lot to keep track of, and it's
24 hard.
25 Q I don't want to sound flippant, but I feel your

1 pain. I'll say I actually have a set of cases right now
2 with 17 patents involved and IPRs coming in on most of
3 them. And it's a lot to keep track of.
4 A Yeah. That must be worse. Okay.
5 Q All right. So are you there on page 15 of the
6 supplemental declaration and the IPR with number ending in
7 697?
8 A Yes. I'm pretty sure I am. Let me look at the
9 front page first. Yes, I am there.
10 And sorry. Page 15 you wanted?
11 Q Yeah. That's right.
12 A Okay. There we go.
13 Q And you should see this on your screen now that
14 I'm sharing it.
15 So here -- and I'll point you to the second to
16 last sentence in paragraph 19, where you say, quote,
17 "Contrary to the patent owner's assertions, however, the
18 Shahoian-Cosper-Rossi combinations as set forth in the
19 petition is not limited to utilizing two separate inverter
20 components."
21 And then you quote -- or you cite to pages 31
22 through 35 of the petition.
23 Do you see that?
24 A I am almost there. Let's see. Oh, so right.
25 The bottom of paragraph 19 is the contrary -- okay.

1 However -- I see that. Yeah.
2 Q And then there's a similar statement in your
3 supplemental declaration in the IPR ending in '698 -- this
4 is second to the last sentence of paragraph 26
5 (indicating) where you say, quote, "Contrary to the patent
6 owners' assertions, however, the Azumi-Cosper-Rossi
7 combinations as set forth in the petition is not limited
8 to utilizing two separate inverter components."
9 A Okay.
10 Q Now, when you say that the petition -- the
11 "combinations as set forth in the petitions are not
12 limited to utilizing two separate inverter components,"
13 does the -- do the petitions actually describe doing
14 anything other than using two separate inverters?
15 MR. DEUTSCH: Objection. Form.
16 THE WITNESS: I would have to repre- -- refresh
17 my memory on the petition to answer that.
18 MR. RUBIN: Fair enough. Well, let me share
19 copies of these two petitions with you.
20 BY MR. RUBIN:
21 Q So you should have, available in the chat
22 function now, paper 2 from IPR2024-00697, which is the
23 petition in that IPR.
24 A Yeah. I've got those now.
25 Q And then paper 3 from the IPR2024-00698.

1 A That one says "updated" in the name, and the '697
2 does not, but yeah, I have those.
3 Q All right.
4 A Sorry. Is there an active question right now?
5 Q Not right at this moment.
6 A Okay.
7 Q So, first, I'd like to point you to a discussion
8 in a petition from the IPR with number ending in 697.
9 A Okay.
10 Q So there's a paragraph that begins at the bottom
11 of page 33 of the petition. And the second sentence of
12 that -- well, the first sentence of that paragraph says,
13 quote --
14 A Oh, sorry. I'm on the wrong document. I'm
15 sorry. '697 petition. All right. Page 33.
16 Q Yeah. Bottom of the page. Should see it --
17 A Yeah. (Indiscernible) --
18 Q -- share from my screen. I'll --
19 A -- page number things. I'll be right there.
20 Okay. Bottom of 33.
21 Q Right. So the first sentence of the paragraph
22 starting at the bottom of 33 says, quote, "First a POSITA
23 would have predictably looked for other references, such
24 as Rossi for implementation details of an H-bridge switch,
25 to further Shahoian's stated objectives."

1 Do you see that?
2 A Yes.
3 Q And the next sentence describes implementation
4 details. It says, quote, "Rossi plainly demonstrates a
5 well-known H-bridge that receives as input a drive signal
6 ("IN1"), which is then split and one branch inverted to
7 generate complimentary internal signals."
8 Do you see that?
9 A Yes.
10 Q So as -- withdrawn.
11 So in the description of Rossi's H-Bridge switch
12 implementation here in the petition, Rossi has described
13 as splitting IN1, and then after that signal's been split,
14 invert it; correct?
15 A "Which is then split" I think agrees with your
16 statement. Or I should say "then split and one branch
17 inverted." You -- yeah. I think that's what you said.
18 Q And so that's describing the Rossi implementation
19 that uses two separate inverter components; correct?
20 A I do not see that here. I see one branch is
21 inverted.
22 Q Now, right after the sentence that refers to the
23 IN1 signal being split and one branch inserted --
24 inverted, there's a citation to figures 4 and 6 of Rossi.
25 You see that?

1 A I see that, yes, on the top of the next page.
2 Q I suppose I should share a copy of Rossi with
3 you. You should see in the chat a copy of Apple
4 Exhibit 1020, which is the same in both of the IPRs. It's
5 the Rossi patent 4,879,641.
6 A I just loaded it -- just downloaded it.
7 Q So, I guess, focusing on the petition from the
8 '697 IPR, you would agree that the pages that you cite
9 from that petition, pages 31 through 35, do not mention
10 Rossi figure 1; correct?
11 MR. DEUTSCH: Objection. Form.
12 THE WITNESS: I'm not seeing pages 30 -- sorry.
13 The citations on page 33 and 34; is that what you mean?
14 Which citations are you talking about that do not mention
15 one of the figures?
16 MR. RUBIN: Fair enough.
17 BY MR. RUBIN:
18 Q So earlier we were looking at your supplemental
19 declaration.
20 A Yeah.
21 Q Page 15 which says, quote, "Contrary to patent
22 owners' assertions, however, the Shahoian-Cosper-Rossi" --
23 a "combination as set forth" in -- "the petition is not
24 limited to utilizing two separate inverter components.
25 See petition pages 31 through 35."

1 A I see. Okay.
2 Q Okay. And so my question is whether pages 31
3 through 35 of the petition mention Rossi figure 1?
4 A No. I clearly don't remember that for sure. So
5 I would have to read it to give you a definitive answer.
6 35, 31 -- that's four pages of reading, if you want --
7 five pages of reading, if you want me to do that. But
8 yeah.
9 Q Yeah. Sure. Please. Take a look at those
10 pages.
11 A All right.
12 Well, now I have to look at these references. I
13 mean, at the bottom of 31, right there at the beginning,
14 it says, "The driving signal IN1 is split and a portion
15 passed through an inverter I to generate an internal
16 driving signal IN1. And an inverted signal thereof IN1
17 bar."
18 And there's cites to that. So they don't -- it
19 doesn't say "more than one inverter" there. It says "an
20 inverter."
21 I will also add that a POSITA would, in about one
22 second, understand the equivalence of an inverter -- of a
23 single inverter being used to create a single inverted
24 signal at the equivalence of a single-inverter circuit to
25 the circuit in figure 6, which you are apparently

1 referring to -- figure 6 of Rossi.
2 MR. RUBIN: Dr. Hannaford, I have no further
3 questions for you today. I'll pass the witness.
4 MR. DEUTSCH: Let's take a five-minute break, if
5 we could.
6 MR. RUBIN: Sure.
7 THE STENOGRAPHER: Off the record at 11:22 a.m.
8 (Off the record.)
9 THE STENOGRAPHER: Back on the record at
10 11:29 a.m.
11 MR. DEUTSCH: Dr. Hannaford, I have no further
12 questions. Thank you for your time today.
13 THE WITNESS: Thank you all.
14 MR. RUBIN: Thank you.
15 THE WITNESS: Bye.
16 THE STENOGRAPHER: Off the record at 11:29 a.m.
17 (Time noted 11:29 a.m.)
18
19
20 ---o0o---
21
22
23
24
25

1)
2 STATE OF CALIFORNIA)
3)
4 CERTIFICATE OF REPORTER
5
6 I, JUSTYNE N. JOHNSON do hereby certify:
7
8 That Dr. Blake Hannaford, the Witness whose
9 deposition is hereinbefore set forth, was duly sworn by
10 me before the commencement of such deposition and that
11 such deposition was taken before me and is a true record
12 of the testimony given by such witness.
13
14 I further certify that both parties were represented
15 by counsel at the deposition.
16
17 I further certify that the deposition of Dr. Blake
18 Hannaford, occurred remotely on June 23, 2025, commencing
19 at 9:36 a.m. to 11:29 a.m.
20
21 I further certify that I am not related to any of the
22 parties to this action by blood or marriage, I am not
23 employed by or an attorney to any of the parties to this
24 action, and that I am in no way interested, financially or
25 otherwise, in the outcome of this matter.

Ex. 2020
Apple v. Resonant Systems, IPR2024-00698
Page 42 of 58

1 IN WITNESS WHEREOF, I have hereunto set my hand
2 this 23rd day of June, 2025.
3
4 Justyne Johnson
5 JUSTYNE N. JOHNSON, CSR NO. 14301
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

A
ability 8:4
able 10:20, 12:4, 26:23, 31:6
about 7:19, 8:16, 12:19, 12:22, 14:23, 17:24, 22:3, 22:16, 22:19, 22:20, 23:3, 23:6, 25:6, 26:9, 26:16, 27:7, 28:18, 28:25, 34:9, 39:14, 40:21
accelerated 23:10
accelerating 18:13, 23:5, 24:13
acceleration 16:2, 16:15, 16:18, 16:23, 17:3, 17:4, 17:5, 17:9, 17:13, 17:20, 20:2, 20:10, 21:14, 21:20, 21:23, 22:5, 22:8, 22:11, 22:12, 22:14, 23:4, 23:5, 23:9, 23:12, 24:17
accelero 16:22, 22:5
accelerometer 15:17, 16:1, 16:15, 16:20, 19:3, 19:5, 19:15, 19:21, 19:24, 20:1, 20:8, 21:5, 21:10, 21:19, 21:20, 22:3, 22:4, 22:5
accelerometers 16:11, 16:19, 18:24
according 21:18
accordingly 27:21
accurate 8:1
accurately 28:23
action 42:22, 42:24
active 37:4
actually 10:22, 19:23, 22:17, 35:1, 36:13
actuator 26:17
actuators 31:22
add 40:21
address 8:7
adjust 23:1
affect 8:4
affects 28:4
after 38:13, 38:22
again 7:19, 24:6, 24:15, 33:14
age 20:25
ago 27:4
agree 13:23, 15:9, 15:12, 16:6, 17:25, 18:8, 18:17, 20:25, 21:18, 22:2, 23:16, 24:9, 25:20, 28:16, 28:25, 30:9, 30:14, 30:19, 32:11, 39:8
agrees 38:15
ahead 7:5, 11:20, 12:2
all 2:4, 11:15, 16:23, 24:22, 26:1, 26:15, 27:1, 31:20, 34:15, 34:22, 35:5, 37:3, 37:15, 40:11, 41:13
almost 35:24
also 8:20, 11:10, 20:17, 24:22, 32:18, 40:21
amend 30:13
among 18:18
amplitude 29:11, 29:19, 29:22, 30:3, 32:3, 34:4
analogous 12:19, 33:3, 33:18
analysis 23:15, 24:7
analyze 23:8
angeles 3:9
another 17:19, 24:19, 27:3, 31:2
answer 8:5, 19:9, 19:10, 28:23, 30:2, 33:13, 36:17, 40:5
any 7:19, 7:21, 7:22, 7:25, 8:3, 9:11, 9:15, 9:22, 10:16, 16:24, 23:4, 23:7, 28:3, 33:5, 33:7, 33:19, 33:21, 42:21, 42:23
anything 32:22, 36:14
apparently 40:25
appeal 1:2
appearances 3:1
appearing 2:4
apple 1:5, 6:6, 6:20, 9:2, 11:11, 12:9, 18:18, 39:3
apple's 8:8
application 25:5, 30:7
applied 21:14, 21:20, 21:24, 22:5
applies 22:9
applying 25:21
approximately 18:14
art 33:3, 33:18
asked 23:3
assertions 35:17, 36:6, 39:22

assisted
25:17
assume
17:25
attorney
3:6, 3:16, 42:23
audio
22:25
august
3:4, 6:17
available
36:21
aware
8:9
away
26:24
azumi-cosper-rossi
36:6

B

back
11:18, 11:25, 34:12, 41:9
bandwidth
30:11, 30:15, 30:18, 30:23, 30:24, 32:6, 32:11, 32:14, 32:15, 32:16, 32:18
bar
40:17
based
13:25, 24:1
basis
24:8
beam
23:12
bear
8:22
because
20:2, 23:3, 23:6, 23:15
becomes
27:24
been
7:2, 7:12, 19:21, 34:21, 38:13
before
1:2, 2:6, 9:9, 24:1, 42:10, 42:11
beginning
2:5, 40:13
begins
37:10
behalf
2:4
being
38:23, 40:23
believe
16:11
belong
14:6
best
10:11
between
13:10, 29:8, 30:10, 30:14, 34:6
bi-directional
32:4
bias
26:4
blake
1:18, 2:3, 4:3, 6:13, 7:1, 8:23, 42:8, 42:17
blank
10:3, 10:4
blocking
11:6
blood
42:22
board
1:2
both
11:8, 32:2, 34:1, 39:4, 42:14
bottom
9:2, 20:22, 35:25, 37:10, 37:16, 37:20, 37:22, 40:13
boulevard
3:7
bouncing
23:12, 23:17
branch
38:6, 38:16, 38:20, 38:23
break
34:9, 41:4
bug
11:7
bye
41:15

C

california
3:9, 6:10, 42:2
called
19:2, 23:20
came
11:3
cannot
7:22, 7:25
case
1:6, 1:10, 6:6, 10:15
cases
35:1
casual
24:8
cause
29:18
causing
29:11
certainly
8:15, 13:8, 22:9
certificate
42:4
certification
6:12
certified
2:7, 6:11, 7:2
certify
42:6, 42:14, 42:17, 42:21
chair
18:12
change
24:11, 24:16, 24:18, 29:7, 29:21, 30:3, 30:5
chat
10:14, 11:2, 11:10, 12:6, 20:17, 31:3, 36:21, 39:3
check
26:1
choose
16:21
circuit
40:24, 40:25
citation
38:24
citations
39:13, 39:14
cite
33:7, 33:21, 35:21, 39:8
cites
40:18
citing
15:6, 15:16, 21:5, 21:11
civil
14:21, 14:23, 15:11, 16:21, 16:22
clarification
21:7
clear
13:8, 33:14
clearly
14:5, 40:4
close
28:20, 29:2
collins
20:24
column
31:16, 31:20, 32:2
com
3:10, 3:20
combination
39:23

Ex. 2020
Apple v. Resonant Systems, IPR2024-00698
Page 45 of 58

combinations
35:18, 36:7, 36:11
coming
35:2
commencement
42:10
commencing
42:18
common
19:7
commonly
19:2
compare
34:6
compared
32:17
compelling
31:23
competing
18:23
compile
34:21
complete
7:23, 8:1
complimentary
38:7
components
30:17, 35:20, 36:8, 36:12, 38:19, 39:24
composed
30:18
concept
17:2, 17:8
concerning
8:8, 12:9
confirm
23:2
conjunction
24:17
consult
10:17
consulted
15:22
contain
19:2
contained
10:17
continues
28:7
contrary
35:17, 35:25, 36:5, 39:21
contrasting
18:2
contribute
32:5, 32:10
contributing
32:12
control
26:3, 32:4
controlled
32:4
controller
28:6
copies
8:18, 9:8, 9:10, 9:15, 10:7, 10:14, 10:18, 12:10, 36:19
copy
8:14, 8:18, 9:3, 9:20, 15:3, 15:20, 26:10, 39:2, 39:3
correct
7:13, 10:6, 16:9, 18:3, 18:19, 20:3, 20:14, 21:21, 24:3, 28:20, 29:13, 29:15, 29:19, 32:24, 33:9, 33:23, 38:14, 38:19, 39:10
corresponds
32:15
cosper
12:19, 13:15, 13:24, 25:4, 25:5, 25:10, 25:20, 26:2, 27:6, 28:11, 28:13, 28:25, 33:2, 33:6, 33:17, 33:19
could
23:8, 23:16, 23:21, 23:24, 24:2, 26:7, 28:22, 30:16, 32:18, 34:17, 41:5
counsel
6:15, 7:5, 11:13, 11:20, 12:2, 42:15
craig
3:15, 6:19
create
40:23
csr
1:29, 43:5
culminations
34:16
cut
19:10

D

damper
30:19
damping
26:17
date
8:15, 9:5, 9:8, 9:24, 10:4
day
43:2
declara
21:24
declaration
8:23, 9:18, 10:1, 10:16, 12:14, 14:24, 15:1, 15:7, 34:17, 34:18, 35:6, 36:3, 39:19
declarations
8:12, 8:19, 8:21, 8:22, 9:5, 9:11, 10:15, 21:6, 21:11, 32:21, 33:17
decrease
29:11, 29:19, 30:4, 30:6, 30:7
def
18:2
defining
16:14
definition
15:16, 15:25, 21:5, 21:6, 21:10, 21:11, 21:13, 21:19, 21:25
definitions
18:2, 20:24
definitive
40:5
demonstrates
38:4
denoted
18:13
depends
30:6
deponent
6:12
depos
6:12
deposed
7:12
deposition
1:18, 2:3, 6:8, 7:15, 9:14, 9:16, 24:8, 42:9, 42:10, 42:11, 42:15, 42:17
describe
26:17, 36:13
described
14:1, 25:15, 26:5, 38:12
describes
13:9, 38:3
describing
38:18
description
13:2, 38:11

desirable
27:21
desk
19:22, 19:25, 20:1, 20:9, 20:10, 22:3
desktop
10:22
detail
9:10
details
37:24, 38:4
determination
13:25
determining
19:6, 19:15
deutsch
3:15, 6:19, 11:1, 11:3, 13:7, 14:3, 14:13, 14:22, 16:10, 17:7, 17:16, 17:23, 18:25, 19:8, 19:17, 20:4, 20:12, 21:22, 22:7, 22:15, 23:19, 24:4, 24:14, 25:24, 28:21, 29:4, 29:14, 29:20, 30:12, 30:25, 32:13, 32:25, 33:10, 33:24, 36:15, 39:11, 41:4, 41:11
deutsch@fr
3:20
device
19:6, 19:16, 21:13, 23:5
devices
14:7, 18:24, 34:2, 34:3, 34:7
dictionary
15:6, 15:10, 15:16, 15:19, 15:22, 16:17, 16:21, 20:24
differed
23:25
difference
13:10, 24:2, 29:8
different
8:19, 11:1, 14:6, 18:5, 23:8, 34:3, 34:7
difficulty
22:25
digit
18:16
digital
20:25
discussing
19:21
discussion
37:7
discussions
34:15
displayed
15:4, 15:13, 20:15, 20:18, 21:2, 24:24, 25:8, 26:12, 26:19, 26:21, 31:10, 31:14, 31:18
document
20:15, 37:14
documents
9:15, 11:2, 11:11
doing
36:13
doppler
23:21, 23:23
download
10:20, 10:21, 12:4, 31:6
downloaded
39:6
downloading
11:9
downloads
10:23
dr
6:21, 7:10, 12:4, 41:2, 41:11, 42:8, 42:17
drive
38:5
driven
28:7
driving
27:13, 28:12, 28:14, 28:19, 29:1, 40:14, 40:16
duly
42:9
during
24:8

E

each
8:22, 9:4, 11:12, 12:9, 13:15
earlier
39:18
earthquake
14:12, 16:3, 16:7
effects
31:24
either
26:8
elastic
32:5, 32:10
electrical
21:15
electromechanical
14:7, 34:3, 34:7
electronic
9:15, 10:14, 10:18
electronics
20:24
elements
26:14, 26:15
eliminate
27:22
elimination
25:16, 25:22
employed
42:23
encompasses
23:7
endeavor
12:23, 13:6, 13:10, 13:16, 13:20, 13:24, 14:18, 14:20, 33:3, 33:18
ending
9:18, 10:1, 24:20, 31:4, 35:6, 36:3, 37:8
engine
25:17
engineering
14:21, 14:24, 15:11, 16:21, 16:22
enough
36:18, 39:16
equivalence
40:22, 40:24
equivalent
30:22
esq
3:5, 3:15
essence
33:1
even
19:24
ever
15:22
every
19:1
everything
33:12
evidence
33:6, 33:8, 33:19, 33:21
exact
8:15
examination
4:2, 7:8
examined
7:3

example
16:16, 16:22, 23:11, 25:15, 25:20
examples
26:2, 26:8, 26:18
excerpts
15:10
executaries
32:21
exhibit
9:1, 11:11, 11:12, 12:5, 12:8, 15:2, 15:4, 15:10, 15:13, 15:15, 20:17, 20:18, 21:2, 21:9, 24:19, 24:20, 24:24, 25:6, 25:8, 26:12, 26:19, 26:21, 27:6, 31:2, 31:3, 31:9, 31:10, 31:14, 31:16, 31:18, 39:4
exhibits
5:1
experiencing
20:3, 22:14
exploited
23:21
extent
32:14, 32:16
external
27:15, 27:23

F

fact
23:9, 32:18
fair
36:18, 39:16
fall
13:15, 13:24, 14:1, 17:21, 18:10, 18:11, 20:11
familiar
7:15, 17:2, 17:8
far
19:1
features
32:4, 32:9
feedback
27:22
feel
10:17, 34:25
field
9:24, 12:23, 13:2, 13:6, 13:9, 13:10, 13:11, 13:15, 13:19, 13:24, 14:1, 14:10, 14:18, 14:20, 16:8, 16:12, 33:2, 33:18
figure
24:2, 26:20, 39:10, 40:3, 40:25, 41:1
figures
26:7, 26:9, 26:13, 38:24, 39:15
filed
10:15, 10:17, 12:9, 12:11, 12:12
final
10:16
financially
42:24
firm
6:11
first
7:2, 9:2, 11:4, 11:6, 13:14, 15:25, 20:23, 27:13, 27:20, 31:20, 35:9, 37:7, 37:12, 37:21, 37:22
fish
3:14, 6:19
five
40:7
five-minute
41:4
flexures
32:5, 32:10
flippant
34:25
floor
3:8
focusing
39:7
folder
10:23
followed
16:16
follows
7:3
force
20:2, 31:23, 32:6, 32:11
form
13:7, 14:3, 17:16, 17:23, 19:8, 20:4, 20:12, 21:22, 22:7, 22:15, 23:19, 24:4, 24:7, 24:14, 24:16, 25:24, 28:21, 29:4, 29:14, 29:20, 30:12, 30:17, 30:25, 32:13, 32:25, 33:10, 33:24, 36:15, 39:11
formal
24:16
forth
35:18, 36:7, 36:11, 39:23, 42:9
four
12:7, 40:6
frame
17:14
free
10:17, 17:21, 18:10, 18:11, 20:11
frequencies
29:8
frequency
27:9, 27:15, 27:16, 27:23, 27:24, 27:25, 28:5, 28:8, 28:19, 28:20, 29:1, 29:11, 29:18, 32:3, 34:5
front
10:7, 19:22, 20:9, 35:9
full
7:23
function
10:14, 11:10, 24:12, 31:3, 36:22
fundamental
16:18, 16:23
further
9:9, 37:25, 41:2, 41:11, 42:14, 42:17, 42:21

G

g
18:14
generate
38:7, 40:15
give
7:22, 7:25, 24:16, 31:17, 40:5
given
16:17, 26:8, 42:12
go
7:5, 7:18, 9:9, 11:13, 11:20, 11:22, 12:2,

Ex. 2020
Apple v. Resonant Systems, IPR2024-00698
Page 48 of 58

26:7, 26:9, 26:10, 35:12
going 6:4, 10:13, 10:23, 24:19
gone 26:24
good 6:4, 6:16, 7:10, 7:11, 31:8
gravitational 20:2
gravity 22:9
great 20:23
ground 7:19, 14:12, 16:3, 16:7
guess 7:18, 9:9, 12:18, 25:23, 26:1, 26:10, 30:5, 33:11, 39:7

H

h-bridge 37:24, 38:5, 38:11
hand 6:22, 43:1
hannaford 1:18, 2:3, 4:3, 6:13, 6:21, 7:1, 7:10, 8:23, 12:4, 41:2, 41:11, 42:8, 42:18
hard 34:24
heard 18:20
here 8:7, 10:24, 18:18, 20:23, 24:6, 31:16, 33:12, 35:15, 38:12, 38:20
hereby 42:6
hereinbefore 42:9
hereunto 43:1
high 27:14, 28:13, 28:15, 28:18, 29:3, 29:13, 30:22, 30:24, 32:5, 32:6, 32:10, 32:15, 32:16, 32:17, 32:18, 32:23, 33:9, 33:22, 34:1
high-bandwidth 31:23
high-magnitude 31:22
highlighted 16:13
highly 27:16
hm 10:25
hope 18:7
however 35:17, 36:1, 36:6, 39:22
hypothetical 20:5, 24:5

I

identical 10:8, 10:12
identifies 13:6
illness 8:3
imagine 19:20
imagined 24:11
implementation 37:24, 38:3, 38:12, 38:18
implying 18:1
importance 28:19, 29:1, 29:6
in1 38:13, 38:23, 40:14, 40:16
inc 1:5, 1:11, 6:6, 6:18, 6:20
include 14:11, 14:21
including 25:16, 26:4, 34:16
incomplete 20:5, 24:4
incorporate 27:21
incorporated 34:2
index 4:1
indicate 10:4
indicating 36:5
inertial 17:14
input 38:5
inserted 38:23
inside 20:1, 22:4
instead 30:4
interested 42:24
interesting 10:25
internal 38:7, 40:15
interpret 16:12
interpreted 16:14
interval 24:18
introduce 6:15
invention 31:22
inverse 30:9, 30:14
invert 38:14
inverted 38:6, 38:17, 38:21, 38:24, 40:16, 40:23
inverter 35:19, 36:8, 36:12, 38:19, 39:24, 40:15, 40:19, 40:20, 40:22, 40:23
inverters 36:14
involved 35:2
iphone 18:19, 18:21, 18:22
iphones 18:23
ipr 1:7, 1:11, 6:7, 9:18, 10:1, 12:11, 12:12, 12:14, 24:20, 31:3, 34:18, 35:6, 36:3, 36:22, 36:23, 36:25, 37:8, 39:8
iprs 8:7, 8:8, 8:11, 11:12, 12:9, 35:2, 39:4
issue 10:16, 32:16
itself 21:20, 22:6, 22:13, 23:6,

23:14

J

job
1:31
johnson
1:28, 2:6, 6:10, 42:6, 43:5
june
1:20, 2:6, 6:1, 6:5, 42:18, 43:2
justyne
1:28, 2:6, 6:10, 42:6, 43:5

K

kabat
3:4, 6:17
keep
34:23, 35:3
kind
17:4
know
13:9, 18:9, 18:23, 19:1, 26:16, 26:18, 29:7, 33:12, 34:4
knowledge
10:11

L

language
13:5, 13:20, 14:1
last
9:4, 9:19, 10:2, 15:15, 21:4, 21:9, 25:11, 25:14, 29:6, 29:10, 35:16, 36:4
law
3:6, 3:16
least
20:8, 21:18
legal
13:10
less
30:5, 30:7
let's
35:24, 41:4
light
23:12, 23:17, 23:24, 23:25
limited
35:19, 36:7, 36:12, 39:24
line
9:23, 10:3, 10:4, 32:2
little
11:7
loaded
39:6
local
26:10
located
6:13, 23:13
look
34:17, 35:8, 40:9, 40:12
looked
26:2, 37:23
looking
15:25, 26:6, 39:18
looks
11:3
los
3:9
loss
27:14
lot
34:23, 35:3
low
27:14, 29:17, 30:3, 30:23, 32:12, 32:15, 32:19, 33:7, 33:20, 34:1
lower
27:12

M

made
9:14
make
17:24
marriage
42:22
mass
26:3, 26:16, 30:19
masses
26:15
material
32:5, 32:10
materials
9:11
matter
6:6, 42:25
matters
7:13
maybe
19:11, 22:24
mean
14:15, 17:22, 29:5, 33:11, 34:19, 34:20, 39:13, 40:13
means
14:16, 17:15
meant
10:3, 17:13, 17:20, 18:9, 33:6, 33:8, 33:20, 33:22
measure
16:2, 16:6, 16:19, 22:11, 22:12, 23:8, 23:11, 23:16, 23:24
measured
24:11
measures
21:14
measuring
14:11, 16:2, 16:15, 20:1, 20:9, 22:4, 22:8
mechanical
26:4, 27:9, 27:13, 27:24, 28:4, 28:6, 28:12, 28:14, 30:10, 30:15, 30:16, 30:17, 30:21, 32:9
medication
8:4
memory
8:4, 36:17
mention
39:9, 39:14, 40:3
meters
18:14
methods
26:3
minneapolis
3:19
minnesota
3:19
minute
11:22
misstated
30:2
mode
27:9
moment
27:4, 37:5
monday
1:20, 6:5
more
31:23, 40:19
morning
6:4, 6:16, 7:10, 7:11
most
14:25, 35:2
movement
16:23
must
35:4

N

name
6:10, 9:23, 10:5, 37:1
natural
27:23

near
27:9, 27:14, 28:7
need
11:13, 27:22, 32:12
neil
3:5, 6:16
new
15:10
next
27:20, 28:3, 38:3, 39:1
none
5:2
noted
41:17
nrubin@raklaw
3:10
number
6:12, 9:18, 9:19, 20:21, 20:22, 35:6, 37:8, 37:19
numbers
6:7, 9:1, 34:22

O

object
17:13, 17:20, 22:12, 22:13, 23:12, 23:13, 23:17, 23:25, 24:1, 24:3, 24:13
objection
13:7, 14:3, 14:13, 14:22, 16:10, 17:7, 17:16, 17:23, 18:25, 19:8, 20:4, 20:12, 21:22, 22:7, 22:15, 23:19, 24:4, 24:14, 25:24, 28:21, 29:4, 29:14, 29:20, 30:12, 30:25, 32:13, 32:25, 33:10, 33:24, 36:15, 39:11
objections
19:17
objectives
37:25
observer
17:14, 17:21, 18:9, 18:10, 18:11, 20:11
occurred
42:18
occurs
24:18
offer
12:18, 12:22, 33:5, 33:16
offering
25:6, 33:5, 33:16
office
1:1, 18:12
oh
11:5, 20:22, 35:24, 37:14
okay
8:17, 8:22, 9:4, 9:7, 9:9, 12:16, 17:10, 18:21, 19:24, 25:4, 26:9, 35:4, 35:12, 35:25, 36:9, 37:6, 37:9, 37:20, 40:1, 40:2
one
11:6, 19:5, 19:14, 19:23, 25:12, 25:15, 37:1, 38:6, 38:16, 38:20, 38:23, 39:15, 40:19, 40:21
only
9:23
open
31:7
operate
27:8
opinion
13:5, 13:11, 13:23, 14:4, 14:20, 14:23, 23:14, 24:7, 24:16, 33:1, 33:5, 33:25
opinions
12:18, 12:22, 25:6, 33:16
optical
26:14, 26:15
orientation
19:6, 19:15
oscillate
28:7
oscillating
25:16, 25:17, 26:4
oscillations
29:22
oscillatory
27:8
other
9:11, 18:19, 25:21, 26:8, 30:17, 36:14, 37:23
otherwise
42:25
out
24:2
outcome
42:25
output
21:15, 31:22, 32:6, 32:11
over
7:18, 7:24, 24:18, 25:13, 25:25
own
18:21, 18:22
owner
1:13, 2:4, 3:3, 6:17
owner's
35:17
owners
36:6, 39:22

P

pacific
2:5
page
9:2, 9:4, 9:19, 9:22, 10:2, 12:13, 15:4, 15:9, 15:13, 15:15, 20:18, 20:22, 20:23, 20:24, 21:2, 21:4, 21:9, 24:24, 25:8, 26:12, 26:19, 26:21, 27:12, 31:10, 31:14, 31:16, 31:18, 35:5, 35:9, 35:10, 37:11, 37:15, 37:16, 37:19, 39:1, 39:13, 39:21
pages
1:33, 35:21, 39:8, 39:9, 39:12, 39:25, 40:2, 40:6, 40:7, 40:10
pain
35:1
paper
36:22, 36:25
paragraph
12:17, 12:18, 13:1, 13:4, 13:14, 13:21, 14:2, 14:5, 14:15, 25:10, 25:12, 25:14, 26:5, 27:7, 27:12, 27:20, 28:11, 28:13,

31:21, 35:16, 35:25, 36:4, 37:10, 37:12, 37:21
particular 12:22, 14:5
parties 2:4, 42:14, 42:22, 42:23
parts 33:13
pass 41:3
passed 40:15
patent 1:1, 1:2, 1:8, 1:12, 1:13, 2:4, 3:3, 6:17, 8:9, 8:21, 12:10, 12:23, 13:1, 13:6, 13:21, 13:25, 14:11, 14:21, 16:8, 16:12, 25:4, 25:5, 31:13, 33:19, 34:5, 35:17, 36:5, 39:5, 39:21
patent's 13:6
patents 35:2
pc 3:14
penguin 15:10
personally 15:19
pertinent 16:22
petition 35:19, 35:22, 36:7, 36:10, 36:17, 36:23, 37:8, 37:11, 37:15, 38:12, 39:7, 39:9, 39:23, 39:25, 40:3
petitioner 1:7, 3:13, 6:20, 18:18
petitions 36:11, 36:13, 36:19
ph 1:18, 2:3, 6:13, 8:24
phenomenon 23:20, 23:23
phone 19:1, 19:25, 22:9
physical 16:18, 32:17
physics 18:13
place 6:8
plainly 38:4
planet 6:11
please 6:15, 6:22, 34:17, 40:9
point 32:22, 35:15, 37:7
pointed 16:13
pop-up 11:6
portion 40:14
posita 37:22, 40:21
possible 23:7, 23:11, 23:14
precise 14:25
predictably 37:23
present 31:21, 33:19
pretty 35:8
previously 7:12, 15:3
principle 18:17
printed 9:10, 9:11, 10:5, 10:7
printouts 8:20
probably 8:18
process 7:15, 7:20
produce 14:7, 34:4, 34:8
product 18:20
professional 15:23
proper 17:2, 17:5, 17:6, 17:9, 17:12, 17:19, 18:3
provide 34:3
provides 31:22
ptab 10:15
pull 10:22
pulled 24:21
put 17:19

Q

quality 32:6
quantity 16:19
question 9:25, 14:16, 19:11, 19:14, 22:24, 28:23, 33:14, 37:4, 40:2
questions 7:19, 7:21, 8:5, 41:3, 41:12
quote 13:1, 13:2, 13:19, 14:2, 16:1, 18:16, 21:13, 25:12, 25:14, 27:8, 27:13, 28:3, 28:12, 28:14, 31:21, 35:16, 35:21, 36:5, 37:13, 37:22, 38:4, 39:21
quoted 13:5, 13:20

R

raise 6:21
rd 43:2
read 21:13, 33:12, 40:5
reading 40:6, 40:7
reads 16:1, 25:12, 25:14, 27:13, 27:21, 28:3, 31:21
really 26:16
reason 7:22, 7:25
recall 8:15, 12:24, 15:6, 15:16, 15:24, 21:5, 21:10, 25:6, 26:8
receives 38:5

recor
28:13
record
6:5, 11:14, 11:16, 11:17, 11:18, 11:22, 11:23, 11:24, 11:25, 34:10, 34:11, 34:12, 41:7, 41:8, 41:9, 41:16, 42:11
reduce
29:22, 30:1
refer
13:19
reference
17:14, 27:6, 27:25, 32:22, 34:16
referenced
27:2
references
14:1, 14:6, 27:16, 37:23, 40:12
referred
8:17
referring
13:20, 29:6, 41:1
refers
27:8, 28:11, 28:13, 29:10, 38:22
reflected
23:24, 24:1
refresh
36:16
related
42:21
relationship
30:10, 30:14
relative
17:13, 17:20, 18:10, 18:11, 19:25, 20:10, 20:11, 24:2
relatively
29:10, 29:18
remember
26:2, 40:4
remotely
2:4, 6:8, 42:18
repeat
19:11
report
14:24
reported
1:27
reporter
2:7, 6:11, 7:3, 42:4
repre
36:16
represented
42:14
representing
6:11, 6:17, 6:20
require
27:16
requires
23:15, 24:7
resonant
1:11, 6:6, 6:18, 8:9, 25:16, 25:17, 27:9, 27:14, 27:15, 27:24, 28:4, 28:5, 28:6, 28:7, 28:12, 28:14, 28:20, 29:2, 30:15, 30:16, 30:21, 32:23
resonating
26:16
respect
26:3
response
14:12, 16:2, 16:7
rest
19:25
restate
28:22
richardson
3:14, 6:20
right
6:22, 7:14, 8:13, 8:16, 10:21, 11:15, 18:15, 23:18, 24:7, 24:22, 26:11, 26:23, 26:25, 27:1, 27:3, 31:20, 34:15, 35:1, 35:5, 35:11, 35:24, 37:3, 37:4, 37:5, 37:15, 37:19, 37:21, 38:22, 40:11, 40:13
roots
16:19
rossi
34:16, 37:24, 38:4, 38:12, 38:18, 38:24, 39:2, 39:5, 39:10, 40:3, 41:1
rossi's
38:11
rpr
1:29, 2:6
rubin
3:5, 4:4, 6:16, 7:6, 7:9, 7:11, 10:13, 10:19, 11:1, 11:9, 11:15, 11:21, 12:3, 13:13, 14:9, 14:17, 15:2, 15:5, 15:14, 17:1, 17:10, 17:11, 17:18, 18:4, 19:4, 19:9, 19:13, 19:19, 20:7, 20:16, 20:19, 21:3, 21:8, 22:1, 22:10, 22:18, 23:22, 24:10, 24:19, 24:22, 25:1, 25:9, 26:20, 26:22, 28:24, 29:9, 29:16, 29:23, 30:20, 31:2, 31:5, 31:12, 31:15, 31:19, 32:20, 33:4, 33:15, 34:9, 34:14, 36:18, 36:20, 39:16, 39:17, 41:2, 41:6, 41:14
rules
7:19
russ
3:4, 6:17

S

said
17:19, 23:6, 38:17
same
9:25, 12:11, 13:11, 16:16, 18:1, 18:2, 18:6, 19:17, 22:14, 26:5, 27:12, 30:16, 33:2, 33:17, 39:4
save
7:18
say
13:14, 22:19, 22:20, 25:5, 29:21, 30:5, 32:18, 32:19, 33:13, 35:1, 35:16, 36:5, 36:10, 38:16, 40:19
saying
9:2, 18:1, 18:5, 30:21,

30:22, 30:23, 30:24
says
37:1, 37:12, 37:22, 38:4, 39:21, 40:14, 40:19
scanning
26:11
scope
14:3, 14:13, 14:22, 16:10, 17:7, 17:23, 18:25, 19:8, 20:4, 20:13, 22:7, 22:15, 23:19, 24:14, 29:14, 29:20, 30:12, 30:25, 32:13
screen
15:2, 20:16, 24:23, 25:3, 25:11, 26:23, 27:3, 31:9, 35:13, 37:18
seattle
6:13
second
18:14, 18:16, 31:17, 31:21, 35:15, 36:4, 37:11, 40:22
secondary
27:23
see
9:25, 10:21, 10:24, 11:1, 11:5, 12:20, 13:3, 13:4, 13:17, 13:18, 16:4, 16:5, 20:16, 20:20, 20:21, 20:22, 21:1, 21:16, 21:23, 23:8, 24:23, 25:3, 25:11, 25:18, 26:23, 27:7, 27:10, 27:11, 27:18, 27:19, 28:1, 28:2, 28:9, 28:17, 29:5, 31:9, 31:11, 31:25, 32:1, 32:7, 34:5, 34:6, 35:13, 35:23, 35:24, 36:1, 37:16, 38:1, 38:8, 38:20, 38:25, 39:1, 39:3, 39:25, 40:1
seeing
39:12
selected
34:4
sells
18:18
sense
23:4, 23:5
sensed
28:5
senses
21:14, 21:19
sensor
16:1, 16:15, 22:13, 23:7, 23:13
sensors
16:6, 23:8
sentence
13:14, 13:18, 15:25, 16:13, 16:14, 16:16, 25:11, 25:14, 27:13, 27:20, 28:3, 29:6, 29:10, 31:21, 35:16, 36:4, 37:11, 37:12, 37:21, 38:3, 38:22
separate
35:19, 36:8, 36:12, 36:14, 38:19, 39:24
set
35:1, 35:18, 36:7, 36:11, 39:23, 42:9, 43:1
several
26:13
shahoian
12:19, 13:15, 13:24, 31:13, 32:22, 33:2, 33:8, 33:17, 33:21
shahoian's
37:25
shahoian-cosper--rossi
35:18, 39:22
share
11:10, 15:2, 36:18, 37:18, 39:2
shared
15:3, 26:23, 27:4, 31:9
sharing
35:14
shift
23:21, 23:23, 24:12
shorthand
2:7, 6:11, 7:2
should
12:11, 20:16, 24:22, 25:5, 25:11, 31:9, 35:13, 36:21, 37:16, 38:16, 39:2, 39:3
show
26:14, 26:15
shows
26:14
sic
12:8
signal
38:5, 38:23, 40:14, 40:16, 40:24
signal's
38:13
signals
38:7
signature
9:8, 9:23, 10:4
signature-p1kal
43:3
signed
8:12, 9:24, 10:9
significance
30:6
significant
29:7, 29:19
significantly
29:12, 30:4
similar
36:2
simultaneously
34:23
single
40:23
single-inverter
40:24
sit
24:6
sitting
18:12, 19:21, 19:25, 20:10
sixth
3:17
slightly
30:13
small
29:10, 29:18
smaller
30:4
smartphone
18:24, 19:2, 19:20, 20:9, 22:2
some
12:18, 12:22, 22:25, 23:15
something
21:19, 29:12

sorry
8:8, 11:5, 11:21, 12:12, 14:19, 17:4, 19:9, 22:21, 22:24, 25:13, 25:25, 28:13, 28:22, 30:2, 31:17, 33:13, 35:10, 37:4, 37:14, 37:15, 39:12
sound
34:25
sounds
22:24
source
27:17, 27:23
south
3:17
specifically
28:11
split
38:6, 38:13, 38:15, 38:16, 38:23, 40:14
splitting
38:13
spreadsheet
34:21
spring
26:16, 30:18
springs
26:15
squared
18:14
stable
27:16
stamped
9:1
start
7:23, 25:13, 25:25
starting
12:17, 12:18, 32:2, 37:22
state
42:2
stated
14:4, 14:14, 37:25
statement
20:14, 30:19, 36:2, 38:16
states
1:1
staying
27:6
stenographer
6:4, 6:21, 7:5, 11:13, 11:16, 11:18, 11:23, 11:25, 21:7, 34:10, 34:12, 41:7, 41:9, 41:16
stenographically
1:27
still
32:17
street
3:17
structure
14:12, 16:3, 16:7
subassembly
26:4
submitted
8:11, 10:9, 11:11
suffering
8:3
suggest
16:20
suggesting
32:23, 33:6, 33:8, 33:20, 33:22
suite
3:18
supplemental
8:12, 8:23, 14:25, 34:18, 35:6, 36:3, 39:18
suppose
39:2
sure
17:25, 19:12, 25:5, 33:13, 35:8, 40:4, 40:9, 41:6
switch
37:24, 38:11
sworn
7:2, 42:9
system
25:12, 25:21, 25:22, 27:14, 27:24, 28:4, 28:6, 28:12, 28:14, 28:18, 28:19, 29:1, 29:2, 29:12, 29:17, 30:10, 30:15, 30:16, 30:17, 30:18, 30:21, 32:24
systems
1:11, 6:6, 6:18, 8:9, 14:7, 25:12, 25:15, 25:16, 26:3, 26:5, 26:17, 27:8, 27:22, 33:7, 33:9, 33:20, 33:22, 34:1

T

tab
20:21
take
7:16, 8:18, 10:3, 34:9, 34:17, 40:9, 41:4
taken
2:3, 42:11
taking
6:8, 8:3, 24:15
talk
26:16
talking
22:3, 27:7, 39:14
talks
28:18, 28:25
teaching
32:23
teachings
25:21
technical
13:2, 13:9, 13:11, 14:10, 16:8, 16:12
technology
14:11
tell
17:12, 24:13
testified
7:3
testimony
8:1, 42:12
text
9:22
th
3:8, 8:12
thank
7:6, 11:8, 27:5, 34:20, 41:12, 41:13, 41:14
themselves
23:10
therefore
33:18
thereof
40:16
thing
13:12, 18:2, 18:6
things
11:10, 18:19, 19:5, 19:14, 37:19
think
14:4, 17:17, 17:24, 18:5, 19:9, 20:14, 22:16, 22:19, 22:20, 23:3, 23:6, 33:1,

Ex. 2020
Apple v. Resonant Systems, IPR2024-00698
Page 55 of 58

34:19, 38:15, 38:17
through
26:7, 26:9, 26:10, 35:22, 39:9, 39:25, 40:3, 40:15
time
2:6, 7:18, 24:12, 24:15, 24:18, 41:12, 41:17
title
8:23, 15:9, 20:23
today
7:22, 7:25, 8:7, 9:16, 41:3, 41:12
today's
6:7
top
20:11, 21:4, 21:9, 31:20, 39:1
total
12:7, 30:18
track
34:23, 35:3
tracked
28:5
trademark
1:1
trial
1:2
tried
34:21
true
29:12, 30:8, 42:11
trying
22:23
turn
12:13, 34:15
turning
15:15, 25:10, 27:20
twenty-eight
9:21
two
8:7, 8:8, 8:11, 8:19, 11:1, 11:10, 11:12, 12:9, 17:25, 18:1, 18:2, 18:5, 29:8, 33:13, 35:19, 36:8, 36:12, 36:14, 36:19, 38:19, 39:24
type
16:24
types
14:6, 34:3, 34:7

U

under
9:23
underneath
10:5
understand
10:8, 14:10, 17:15, 17:17, 17:21, 40:22
understandable
16:20
understanding
20:6, 22:25
united
1:1
unless
7:19
unmarked
8:14, 8:18
updated
37:1
upload
10:13, 24:19
uploaded
12:5, 12:10, 20:17, 31:2
use
9:16, 25:15, 32:23
uses
38:19
using
10:13, 22:13, 23:23, 27:15, 32:4, 36:14
usually
18:13, 21:14
utilizing
35:19, 36:8, 36:12, 39:24

V

value
29:13, 29:17, 32:12
values
34:6
variation
28:4
variations
29:11, 29:18
variety
14:6
velocity
23:17, 24:3, 24:16
versa
30:23
versions
10:9
via
1:19, 2:4, 6:8
vibration
16:23, 32:6, 32:11
vibration-generating
34:2
vibrations
14:8, 31:23, 32:3, 34:4, 34:8
vice
30:23
videoconference
1:19, 2:5, 6:9
vs
1:9

W

wait
8:17
want
24:6, 28:23, 30:5, 34:25, 40:6, 40:7
wanted
22:11, 23:2, 35:10
washington
6:14
wavelength
23:24, 23:25, 24:12
way
17:19, 23:4, 26:8, 42:24
ways
18:1, 18:5, 22:12
we're
8:7, 11:9
we've
19:21
well-known
38:5
whereof
43:1
whether
12:19, 18:23, 40:2
wide
14:6
wilshire
3:7
window
11:2, 27:3
withdrawn
7:23, 14:19, 38:10
within
13:15, 13:24, 14:1, 16:8, 16:11
without
9:8, 22:13, 23:5, 24:15
witness
4:2, 7:4, 11:5, 13:8, 14:4,

14:14, 14:23, 16:11, 17:8, 17:17, 17:24, 19:1, 19:11, 19:18, 20:6, 20:14, 21:23, 22:8, 22:16, 23:20, 24:6, 24:15, 24:21, 25:25, 26:13, 28:22, 29:5, 29:15, 29:21, 30:13, 31:1, 31:11, 32:14, 33:1, 33:11, 33:25, 36:16, 39:12, 41:3, 41:13, 41:15, 42:8, 42:12, 43:1
word
16:20, 29:5
work
15:23
working
34:22
worse
35:4
written
21:24
wrong
37:14

X

x
1:14

Y

yeah
11:21, 22:22, 26:11, 29:5, 29:15, 34:19, 35:4, 35:11, 36:1, 36:24, 37:2, 37:16, 37:17, 38:17, 39:20, 40:8, 40:9
year
8:13
yourselves
6:15

Z

zoom
1:19, 2:5, 6:8, 10:14, 10:20, 11:7

"

"in1"
38:6

.

.7
4:4

0

00
34:13
00697
1:7, 6:7, 36:22
00698
1:11, 6:7, 36:25

1

1
1:33, 39:10
10
13:14, 31:14, 31:16, 34:10
1004
31:3, 31:9, 31:10, 31:14, 31:18
1009
24:20, 24:24, 25:8, 26:12, 26:19, 26:21, 27:6
1020
39:4
1051
11:11, 12:5, 15:2, 15:4, 15:10, 15:13
1052
11:12, 12:5, 20:17, 20:18, 21:2
11
26:20, 34:13, 41:7, 41:10, 41:16, 41:17, 42:19
12
3:8, 26:20
12424
3:7
14
26:14, 26:21
14301
1:29, 2:7, 6:12, 43:5
15
35:5, 35:10, 39:21
151
12:8
152
12:8
16
26:19
17
35:2
19
35:16, 35:25

2

2024
1:7, 1:11, 6:7, 36:22, 36:25
2025
1:20, 2:6, 6:1, 6:5, 9:5, 42:18, 43:2
22
41:7
23
1:20, 2:6, 6:1, 6:5, 42:18, 43:2
26
25:8, 36:4
28
8:12, 9:5, 9:22
29
41:10, 41:16, 41:17, 42:19

3

30
39:12
31
10:2, 35:21, 39:9, 39:25, 40:2, 40:6, 40:13
3200
3:18
33
37:11, 37:15, 37:20, 37:22, 39:13
34
39:13
35
35:22, 39:9, 39:25, 40:3, 40:6
36
2:5, 6:1, 6:5, 42:19

4

4,879,641
39:5
43
1:33
45
11:16
46
34:10
48
11:19, 11:23, 12:1

5

55402
3:19
589690
1:31

6

60
3:17
61
32:2
696
31:13
697
8:20, 9:19, 10:24, 11:3, 11:7, 12:14, 24:20, 31:4, 34:19, 34:20, 35:7, 37:1, 37:8, 37:15, 39:8
698
8:20, 10:1, 10:21, 10:24, 11:4, 12:12, 36:3

7

767
8:9, 8:21, 12:10, 12:23, 13:1, 13:6, 13:21, 13:25, 14:10, 14:21, 16:8, 16:12, 33:3, 33:19, 34:5

8

8,093,767
1:8, 1:12
89
12:12
897
12:11, 34:18

9

9
2:5, 6:1, 6:5, 11:16, 11:19, 11:23, 12:1, 42:19
9.8
18:14
90025
3:9