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Transcript of Lawrence E. Larson, Ph.D.

Date: December 9, 2025

Case: MediaTek, Inc. -v- ParkerVision, Inc. (PTAB)

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1 UNITED STATES PATENT AND TRADEMARK OFFICE

2 BEFORE THE PATENT TRIAL AND APPEAL BOARD

3 - - - - - x

4 MEDIATEK, INC., :

5 Petitioner, : IPR2025-00030

6 v. : U.S. Patent No.

7 PARKERVISION, INC., : 8,498,593

8 Patent Owner. :

9 - - - - - X

10
11 Videotaped Deposition of LAWRENCE E. LARSON, Ph.D.

12 Conducted Virtually

13 Tuesday, December 9, 2025

14 10:04 a.m. EST

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18
19
20 Job No.: 611460

21 Pages 1 - 58

22 Reported by: Debra A. Whitehead

1 Videotaped Deposition of LAWRENCE E. LARSON,
2 Ph.D., conducted virtually.
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4

5 Pursuant to notice, before Debra Ann Whitehead,
6 E-Notary Public in and for the Commonwealth of
7 Virginia.
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A P P E A R A N C E S

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C O N T E N T S

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By Mr. Day	50

EXHIBITS MARKED IN TODAY'S SESSION

(Attached to the Transcript)

LARSON EXHIBIT	PAGE
Exhibit 1 Declaration of Dr. Lawrence E. Larson, Ph.D., in Support of Reply	12
Exhibit 2 U.S. Patent No. 8,498,593	19
Exhibit 3 U.S. Patent No. 7,427,897	37
Exhibit 4 U.S. Patent No. 6,646,511	40
Exhibit 5 Article, Microwave Power Amplifiers with Digitally-Controlled Power Supply Voltage For High Efficiency and High Linearity, by Koo, et al.	45

EXHIBITS MARKED IN TODAY'S SESSION - CONTINUED

LARSON EXHIBIT	PAGE
Exhibit 6 Article, A High-Efficiency Linear	47
RF Power Amplifier With a Power-	
Tracking Dynamically Adaptive	
Buck-Boost Supply, by Sahu,	
et al.	

EXHIBITS MARKED IN PRIOR SESSIONS

(Not attached)

EXHIBIT	PAGE
Exhibit 1037	50

1	P R O C E E D I N G S	10:01:26
2	VIDEO SPECIALIST: Here begins Media	10:01:26
3	Number 1 in the video deposition of Dr. Lawrence	10:03:45
4	E. Larson in the matter of MediaTek, Inc., versus	10:03:47
5	ParkerVision, Inc.; being heard in the United	10:03:51
6	States Patent and Trademark Office, before the	10:03:56
7	Patent Trial and Appeals Board. The Case Number	10:03:57
8	is IPR2025-00030; the patent number is 8,498,593.	10:04:00
9	Today is December 9, 2025. The time on	10:04:12
10	the video monitor is 10:04 a.m. eastern time. The	10:04:16
11	remote videographer is George Larkins, CLVS,	10:04:21
12	representing Planet Depos. All parties of today's	10:04:25
13	deposition are attending remotely.	10:04:28
14	Counsel, please state your appearances	10:04:30
15	and who you represent at this time.	10:04:35
16	MR. TO: Anderson To from the law firm	10:04:35
17	Daignault Iyer, representing Patent Owner	10:04:37
18	ParkerVision.	10:04:39
19	MR. DAY: Evan Day from Perkins Coie,	10:04:39
20	representing Petitioner MediaTek.	10:04:44
21	VIDEO SPECIALIST: The court reporter	10:04:47
22	today is Debbie Whitehead, with Planet Depos.	10:04:47

Transcript of Lawrence E. Larson, Ph.D.
Conducted on December 9, 2025

7

1	The witness will now be sworn.	10:04:49
2	LAWRENCE E. LARSON, Ph.D.,	10:04:49
3	having been duly sworn, testified as follows:	10:05:04
4	EXAMINATION BY COUNSEL FOR PATENT OWNER	10:05:04
5	BY MR. TO:	10:05:04
6	Q All right. Dr. Larson, good morning.	10:05:09
7	Can you please state your name, for the	10:05:11
8	record.	10:05:12
9	A Yeah. Good morning. I'm Lawrence	10:05:13
10	Larson.	10:05:15
11	Q Have you had your deposition taken	10:05:19
12	before?	10:05:20
13	A Yes, I have.	10:05:20
14	Q How many times?	10:05:21
15	A Roughly ten, I would say. I don't have	10:05:26
16	an exact number.	10:05:30
17	Q And are they for district court or PTAB?	10:05:31
18	A Both.	10:05:39
19	Q Throughout the deposition I'll ask you a	10:05:39
20	series of questions. Your attorney may object.	10:05:41
21	But unless your attorney specifically instructs	10:05:44
22	you not to answer, you must answer my questions.	10:05:45

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1	Do you understand that?	10:05:47
2	A Yes, I do.	10:05:50
3	Q And if there's any question you don't	10:05:51
4	understand please let me know, and I'll try to	10:05:53
5	rephrase it, if I can. Otherwise I'll assume you	10:05:55
6	understand my question. Okay?	10:05:59
7	A Okay.	10:06:00
8	Q I expect we'll take a short break after	10:06:00
9	each hour of testimony, but you can let me know	10:06:05
10	whenever you need a break and we'll try to	10:06:07
11	accommodate that. I only ask that if there's a	10:06:08
12	question pending, that you provide a response to	10:06:11
13	that question before taking a break.	10:06:12
14	Is that fine?	10:06:13
15	A That's fine.	10:06:16
16	Q Do you have any electronic devices in	10:06:16
17	front of you, other than the device being used for	10:06:19
18	this video deposition?	10:06:21
19	A I have my phone here, but it's turned	10:06:23
20	off.	10:06:25
21	Q Do you have any document open in front of	10:06:25
22	you, either digitally or physically?	10:06:29

1	A	I have physically some exhibits from this	10:06:33
2		case, I have them open in front of me.	10:06:36
3	Q	I'm going to be referring to some trial	10:06:39
4		exhibits as Exhibit 1 to Exhibit 6.	10:06:43
5		Do you have access to those exhibits?	10:06:46
6	A	Exhibit 1 to Exhibit 6? That number	10:06:50
7		doesn't ring a bell. I have the various, you	10:06:53
8		know, labeling 1031, you know, et cetera,	10:06:56
9		et cetera. Ones with a thousand series in front	10:06:59
10		of me.	10:07:03
11	Q	Have you been provided a link to --	10:07:04
12	A	These were exhibits to my report.	10:07:06
13	Q	You should have been provided a link to	10:07:09
14		access the exhibit to this deposition.	10:07:11
15		Do you have access to that link?	10:07:13
16	A	Is that the link that was just provided	10:07:16
17		by Ms. Whitehead?	10:07:17
18	Q	It is not.	10:07:19
19		MR. TO: Why don't we -- why don't we go	10:07:20
20		off the record and have that taken care of.	10:07:22
21		VIDEO SPECIALIST: We're going off the	10:07:24
22		record at 10:07.	10:07:26

1	(A recess was taken.)	10:08:02
2	VIDEO SPECIALIST: We are back on the	10:15:05
3	record at 10:15 a.m.	10:15:08
4	BY MR. TO:	10:15:12
5	Q So, Dr. Larson, you now have access to	10:15:12
6	the exhibits to your deposition, Numbered Exhibit	10:15:16
7	1 to Exhibit 6. Correct?	10:15:19
8	A Correct.	10:15:21
9	Q You mentioned that you have some exhibits	10:15:22
10	printed in front of you.	10:15:25
11	Is that right?	10:15:26
12	A That's correct, yes.	10:15:28
13	Q I'm going to ask you to refer to the	10:15:29
14	digital version, if that's okay with you, just so	10:15:33
15	we can be sure that we are looking at the same	10:15:35
16	thing.	10:15:38
17	A Of course. That's fine.	10:15:39
18	Q On the computer device that is being used	10:15:41
19	for this deposition, do you have any windows or	10:15:46
20	applications open other than this videoconference?	10:15:48
21	A No, none.	10:15:51
22	Q Is there any reason you can't give your	10:15:51

1	full and accurate testimony today?	10:15:58
2	A No, none.	10:15:59
3	Q Are you being compensated for the work --	10:16:00
4	for your work for this case?	10:16:03
5	A Yes, I am.	10:16:07
6	Q What's your hourly rate for this case?	10:16:08
7	A \$600.	10:16:10
8	Q Is that your normal consulting rate?	10:16:11
9	A That's my standard rate, yes.	10:16:13
10	Q How much time did you spend preparing for	10:16:15
11	this deposition?	10:16:18
12	A Well, I would say about ten to 15 hours	10:16:25
13	so far.	10:16:28
14	Q Did you meet with anyone in preparation	10:16:30
15	for this deposition?	10:16:31
16	A I met with Mr. Day in preparation, yes.	10:16:34
17	Q Is there anyone else, or is it just	10:16:36
18	Mr. Day?	10:16:40
19	A Just Mr. Day.	10:16:40
20	Q Can you please open the document marked	10:16:41
21	as Exhibit 1 to your deposition.	10:16:48
22	A Yes.	10:16:53

1	(Larson Deposition Exhibit 1 marked for	10:16:53
2	identification and is attached to the transcript.)	10:16:53
3	A I have it here in front of me.	10:17:05
4	Q Okay. Great. Do you recognize it?	10:17:06
5	A Yes; this is the -- my declaration in	10:17:15
6	support of the reply.	10:17:18
7	Q I'm going to refer to Exhibit 1 as your	10:17:21
8	second declaration for the remainder of this	10:17:24
9	deposition.	10:17:26
10	Is that okay?	10:17:27
11	A Yes.	10:17:28
12	Q Can you go to Paragraph 11 of your second	10:17:28
13	declaration, please.	10:17:33
14	A Yes, I'm there. That's Page 10.	10:17:45
15	Q Yes. And you stated in Paragraph 11 that	10:17:48
16	you proposed construing the term, quote, power	10:17:52
17	efficient, end quote, as, quote, the output power	10:17:54
18	of the power supply compared to its input power,	10:17:58
19	end quote.	10:18:02
20	Is that right?	10:18:02
21	A Yes, that's what I've written.	10:18:04
22	Q Can you give me an example of what you	10:18:07

1	mean by comparison between output power and input	10:18:09
2	power?	10:18:12
3	A Oh, it might be -- well, you know, I'm	10:18:15
4	measuring the output power, measuring the input	10:18:19
5	power, and then, you know, looking at the	10:18:24
6	difference. Could be dividing the output power by	10:18:27
7	the input power. Could just be, you know,	10:18:34
8	measuring their relative values. So it's a	10:18:37
9	rather -- "compared" is rather vague in that	10:18:41
10	context. Not vague, but it can be -- have	10:18:43
11	multiple definitions.	10:18:47
12	Q So you mentioned that it could be	10:18:48
13	dividing the output power by the input power and	10:18:55
14	also measuring their relative values.	10:18:57
15	What do you mean by "measuring their	10:19:01
16	relative values"?	10:19:03
17	A Well, you know, you could, you know,	10:19:06
18	measure one value of power, the output power with	10:19:09
19	the circuit. You could measure another value of	10:19:16
20	the power, which is the input power with another	10:19:20
21	circuit. And then you could compare the two. You	10:19:23
22	know, see how much bigger one is relative to the	10:19:27

1	other.	10:19:29
2	You know, it could be, you know, an even	10:19:32
3	more indirect measurement. It could be, you know,	10:19:37
4	for example, with lots of power amplifiers, if you	10:19:40
5	know the output power, you -- that's a very	10:19:43
6	actually good measure of the output power because	10:19:49
7	the efficient of the amplifier is well understood.	10:19:51
8	So you could just measure the output power, and	10:19:54
9	that would tell you something about the input	10:19:56
10	power. Conversely you could measure the input	10:19:58
11	power, and if the power supply voltage is known,	10:19:59
12	that would tell you something about the output	10:20:02
13	power.	10:20:03
14	So I guess there are many different ways	10:20:04
15	of making that measurement, you know, and they all	10:20:06
16	have their pros and cons. And that's part of what	10:20:09
17	we do when we design these circuits.	10:20:12
18	Q So under your construction of the phrase	10:20:14
19	"power efficiency," are you comparing output power	10:20:18
20	to input power by looking at only output power?	10:20:22
21	MR. DAY: Objection. Form.	10:20:28
22	A Yeah. Well, I mean, no, as I said	10:20:29

1	before, you know, there are lots of different ways	10:20:31
2	you could do it. And you could, actually, you	10:20:33
3	know, look at the input power of a power	10:20:36
4	amplifier. And by "input power" I think I mean	10:20:40
5	like the DC input power, not the RF input power.	10:20:42
6	But if you looked at the, you know, the	10:20:46
7	DC input power, that would tell you something	10:20:49
8	about the output power. And so, you know, another	10:20:50
9	way of inferring the output power from the input	10:20:55
10	power.	10:20:59
11	You know, as I said, these things are	10:21:00
12	measured in multiple different ways in multiple	10:21:02
13	different contexts.	10:21:04
14	Q Okay. But in the context in which you	10:21:06
15	defined it, is looking at output power alone a	10:21:10
16	comparison between output power and input power?	10:21:14
17	MR. DAY: Object to form.	10:21:18
18	A Is looking at the output power by itself	10:21:22
19	a comparison? Well, that's just a single	10:21:25
20	measurement. You make a measurement of the output	10:21:28
21	power, and then that tells you something about the	10:21:30
22	input power. And then that tells you something	10:21:32

1	about the efficiency.	10:21:34
2	Q And my -- so output power might tell you	10:21:36
3	something about input power. But is looking at	10:21:41
4	output power alone a comparison between output	10:21:43
5	power and input power, as you define power	10:21:48
6	efficiency?	10:21:51
7	A Well, I would say that if your -- if your	10:21:52
8	goal is to -- you know, I guess you're kind of	10:21:56
9	focusing on the word "compare" here. And I would	10:22:00
10	say that, you know, output power, measuring output	10:22:02
11	power allows you to infer the input power. And	10:22:05
12	then you can make a comparison between those two,	10:22:09
13	and that will tell you something about the	10:22:11
14	efficiency. So the measurement by itself isn't a	10:22:12
15	comparison, but then, you know, if you take that	10:22:16
16	next step and infer the input power, then you can	10:22:19
17	measure the efficiency, or construe the efficiency	10:22:22
18	or calculate the efficiency or estimate the	10:22:27
19	efficiency perhaps is best.	10:22:28
20	Q I think earlier you testified that	10:22:29
21	dividing the output power and the input power is	10:22:37
22	one way you can compare the two.	10:22:40

1	Is there any other mathematical operation	10:22:43
2	that the word "compare" would comprise -- would	10:22:48
3	encompass?	10:22:53
4	MR. DAY: Object to form.	10:22:54
5	A Well, I mean, you know, comparing could	10:22:56
6	also be a subtraction. And if you had, you know,	10:22:58
7	like -- so I guess subtraction would be one other,	10:23:02
8	you know, way of doing it.	10:23:07
9	You know, making, you know, like a	10:23:11
10	measurement of power, you know, and then if you --	10:23:14
11	so subtraction. And then as I said before, you	10:23:24
12	know, if you just measure output power or input	10:23:28
13	power by itself, that tells you something about	10:23:31
14	efficiency, and you can use that to make a	10:23:33
15	decision.	10:23:35
16	Q Does subtracting output power -- sorry,	10:23:39
17	strike that.	10:23:44
18	Does subtracting output power from input	10:24:06
19	power tell you anything about power efficiency?	10:24:08
20	MR. DAY: Object to form.	10:24:14
21	A Yeah. I'm sorry, let me -- my -- it	10:24:17
22	does. And, you know, the value of that	10:24:23

1	subtraction would tell you something about the	10:24:30
2	efficiency. And, you know, perhaps I can give you	10:24:34
3	an example, you know.	10:24:36
4	Like if the -- if the output power is	10:24:37
5	very small and the input power is very large and	10:24:39
6	you subtract them, you're going to get a very	10:24:41
7	large negative number, and that would tell you	10:24:44
8	something about the efficiency. So -- so yes,	10:24:46
9	that's -- that would be one way to actually, like,	10:24:49
10	you know, use -- that would be a way to use both	10:24:52
11	output power -- that would be a way to use both	10:24:56
12	the measurement of the input power and a	10:24:58
13	measurement of the output power to estimate	10:25:00
14	efficiency.	10:25:02
15	Q Can you determine power based solely on	10:25:05
16	voltage?	10:25:23
17	A I'm sorry, could you repeat the question?	10:25:29
18	Q Yeah. Can you -- can you determine power	10:25:30
19	based solely on voltage?	10:25:33
20	MR. DAY: Object to form.	10:25:36
21	A Well, that -- that's a -- it's kind of a	10:25:38
22	broad question. I mean, power is related to	10:25:40

1	voltage. You know, power is voltage times	10:25:42
2	current. And if you know the resistance, then the	10:25:47
3	resistance is fixed, then the current depends on	10:25:51
4	the voltage. And so in -- you know, power is	10:25:54
5	always dependent on voltage. And you can	10:25:58
6	determine it I would say by measuring voltage in	10:26:01
7	many, many cases.	10:26:05
8	Q If you only know the voltage and you	10:26:07
9	don't know the current nor the resistance, can you	10:26:15
10	calculate power based on voltage alone?	10:26:19
11	MR. DAY: Object to form.	10:26:23
12	A Well, it's hard for me to imagine a case	10:26:25
13	where all you know is voltage and you don't know	10:26:28
14	anything about impedance. But in -- I guess in	10:26:30
15	such a case if you only knew voltage and you knew	10:26:34
16	nothing else about the circuit, then power would	10:26:36
17	be undetermined in that case. However, in most	10:26:40
18	practical cases that's not the case.	10:26:42
19	Q Can you open a document marked as Exhibit	10:26:49
20	2 to your deposition.	10:26:54
21	(Larson Deposition Exhibit 2 marked for	10:26:54
22	identification and is attached to the transcript.)	10:26:54

1	A	Yes. I'm sorry, I'm going to have to --	10:26:59
2		I accidentally closed that window, so I'm going to	10:27:17
3		have to reopen it.	10:27:20
4	Q	No problem. Take your time.	10:27:21
5	A	Okay, I've opened this. This is the '593	10:27:35
6		patent.	10:27:38
7	Q	Can you go to Column 2, Line 63, and let	10:27:39
8		me know when you're there.	10:27:44
9	A	Yes, I'm there.	10:28:06
10	Q	Okay. Column 2, Line 63 to 65, tells you	10:28:07
11		that, quote, Figure 1 illustrates exemplary plots	10:28:13
12		of efficiency versus output current of a typical	10:28:16
13		switching power supply, end quote.	10:28:19
14		Do you see that?	10:28:21
15	A	Yes.	10:28:26
16	Q	Let's go to Figure 1.	10:28:26
17	A	Okay. I'm there.	10:28:32
18	Q	Do you see in Figure 1 -- so Figure 1	10:28:46
19		there's two plots. In both plots the vertical	10:28:49
20		axis is, quote, efficiency, end quote.	10:28:53
21		Do you see that?	10:28:56
22	A	Yes, I do.	10:28:58

1	Q	And this efficiency is expressed in terms	10:28:58
2		of percentage in Figure 1.	10:29:03
3		Is that right?	10:29:05
4	A	Yes, it's expressed as efficiency on the	10:29:09
5		Y axis.	10:29:11
6	Q	And is efficiency expressed in terms of	10:29:18
7		percentage on the Y axis?	10:29:19
8	A	Yes, the Y axis says, Efficiency percent.	10:29:21
9	Q	Do you understand Figure 1 to show that	10:29:26
10		for a given output voltage V_{out} , power efficiency	10:29:36
11		depends on input voltage V_{in} and output current?	10:29:41
12		MR. DAY: Object to form.	10:29:48
13	A	Yes, this -- this chart shows how the	10:29:49
14		efficiency of the power supply -- of a power	10:29:52
15		supply, this particular one, varies as a function	10:29:54
16		of output current for different input voltages at	10:29:57
17		a fixed output voltage of 3.16 volts.	10:30:01
18	Q	So Figure 1 shows that for a given output	10:30:04
19		voltage V_{out} , if you change the input voltage V_{in} ,	10:30:12
20		power efficiency would change. Right?	10:30:17
21		MR. DAY: Object to form.	10:30:20
22	A	It shows that power efficiency changes as	10:30:22

1	the output current changes for a given V_{in} and	10:30:24
2	V_{out} , yes.	10:30:28
3	Q By the same token, Figure 1 also shows	10:30:29
4	that for a given output current, power efficiency	10:30:48
5	also depends on and changes based on the output	10:30:51
6	and input voltage. Right?	10:30:55
7	MR. DAY: Object to form.	10:30:58
8	A Well, I mean, yeah, the efficiency	10:31:01
9	depends on the output and the input voltage for --	10:31:04
10	at different currents.	10:31:08
11	Q Can you go to Column 3, Line 9, please.	10:31:13
12	A Yes, I'm there.	10:31:41
13	Q Okay. Column 3, Line 9 to 11 states,	10:31:42
14	quote, Figure 6 illustrates example efficiency	10:31:50
15	enhancement due to the use of a bypass switch	10:31:53
16	architecture in a switching power supply, end	10:31:56
17	quote.	10:31:58
18	Do you see that?	10:31:59
19	A Yes, I do.	10:32:01
20	Q Let's go to Figure 6.	10:32:02
21	A Okay. Yes.	10:32:22
22	Q Do you understand the vertical axis in	10:32:24

1	Figure 6 to be showing efficiency?	10:32:27
2	A Yes. It's labeled Efficiency Percent.	10:32:34
3	Q I think you anticipated my next question.	10:32:37
4	So efficiency in Figure 6 also is	10:32:39
5	expressed in terms of percentage. Right?	10:32:41
6	A Correct.	10:32:45
7	Q Let's go back to Column 9, Line 20.	10:32:48
8	A I see it.	10:33:11
9	Q Column 9, Line 20 to 24 states, quote, In	10:33:12
10	Example 600 the switching power supply is	10:33:20
11	optimized for a plus 17 dBm output, bracket, 1.39	10:33:25
12	output voltage and 100-milliamp output current,	10:33:33
13	end quote.	10:33:36
14	Do you see that?	10:33:36
15	A I do.	10:33:37
16	Q If Figure 6 is optimized for a different	10:33:37
17	power output and corresponding output voltage and	10:33:40
18	current, efficiency curve 602, as shown in Figure	10:33:42
19	6, would be different than what is shown in Figure	10:33:46
20	6. Right?	10:33:48
21	MR. DAY: Object to form.	10:33:49
22	A Well, I'm sorry, could you repeat that,	10:33:51

1	that question? I just want to make sure I have it	10:33:53
2	correct. I'm going to return to Figure 6 now.	10:33:55
3	Q Yeah. Let me -- let me try to rephrase	10:33:58
4	it a little bit.	10:34:00
5	A Thank you.	10:34:01
6	Q So in Column 9, Line 20 and 24, the	10:34:01
7	portion that we just read, it tells you that	10:34:13
8	Figure 6 is showing an efficiency curve that is	10:34:16
9	optimized for a plus 17 dBm power output.	10:34:21
10	Is that right?	10:34:25
11	A That's what they say.	10:34:26
12	Q Okay. And that plus 17 dBm power output	10:34:27
13	corresponds to a 1.39 output voltage and	10:34:31
14	100-milliamp output current.	10:34:36
15	Is that right?	10:34:38
16	A Well, I think you're now referring back	10:34:41
17	to Figure 3, which we haven't talked about. But	10:34:43
18	Figure 3 shows that at the output power of 17 dBm,	10:34:45
19	the -- yeah, the voltage is 1.3 volts, and the	10:34:53
20	current is about 100 milliamps. So I think you're	10:34:56
21	referring to Figure 3 when you're -- when you're	10:35:00
22	making this point.	10:35:03

1	Q	I am not. I'm just referring to Column	10:35:03
2		9, Line 20 to 24.	10:35:09
3	A	Okay. Well -- I'm sorry, so let me just	10:35:15
4		read Column 9 to 20.	10:35:22
5	Q	Yeah.	10:35:24
6	A	Column 9? Column 9. Lines 20 to 24	10:35:27
7		again.	10:35:31
8		So Figure 6 is an example that	10:35:36
9		illustrates the efficiency enhancement due to the	10:35:38
10		use of a bypass switch architecture and a	10:35:40
11		switching power supply. The switching -- in	10:35:44
12		Example 600, the switching power supply is	10:35:46
13		optimized for a plus 17 dBm output, 1.39 volt	10:35:49
14		output voltage and a 100-milliamp current.	10:35:56
15		So that -- that paragraph refers to	10:35:59
16		Figure 600, but their conclusion that it's	10:36:06
17		optimized for 17 dBm output power at the stated	10:36:10
18		voltage and current, refers to figure -- not	10:36:17
19		Figure 6, but Figure -- Figure 3. And I just --	10:36:25
20		I'm just -- I think that they're just -- I think	10:36:29
21		in their -- what they're trying to say here is	10:36:31
22		that Figure 6 follows from Figure 3, and that's	10:36:34

1	why I'm pointing out Figure 3. Otherwise, to be	10:36:37
2	honest, the paragraph doesn't make any sense.	10:36:42
3	Q Can you explain to me how Figure 6	10:36:57
4	relates to Figure 3?	10:37:20
5	A Yeah. So Figure 6 is -- let's see.	10:37:25
6	Let's go to Figure 3.	10:37:35
7	So Figure 3 shows -- let me just kind of	10:37:38
8	go back and forth here. So there -- there -- they	10:37:43
9	have different X axes, but Figure 6 is a plot of	10:37:48
10	the efficiency of the power supply as a function	10:37:54
11	of the DC current going through the amplifier.	10:37:57
12	And Figure 3 is a plot of the DC current that's	10:38:03
13	going through the amplifier as a function of the	10:38:06
14	output power.	10:38:10
15	So Figure 3 -- you're taking the Y axis	10:38:11
16	for Figure 3, and you're turning that into the X	10:38:19
17	axis of Figure 6. And you'll notice that the	10:38:21
18	current range of the Y axis of Figure 3 is	10:38:25
19	identical to the current range of the X axis of	10:38:29
20	Figure 6.	10:38:34
21	So they're taking the -- they're taking	10:38:36
22	the current from Figure 3, which is the Y axis,	10:38:38

1	and they're turning that into the X axis on Figure	10:38:42
2	6. And then they're using that X axis to	10:38:44
3	calculate -- not to calculate, but perhaps to	10:38:47
4	measure the efficiency of the supply. So that's	10:38:50
5	the relationship between Figure 6 and Figure 3.	10:38:53
6	And you can also see that there's a step	10:39:15
7	I guess at .4 amps. And if you go to Figure 3,	10:39:19
8	that corresponds to the -- to the step that occurs	10:39:25
9	at 27, 28 dBm on the very right-hand side of	10:39:30
10	the -- of the curve.	10:39:34
11	So the step that's -- that occurs in	10:39:36
12	Figure 6 corresponds to the change in slope that	10:39:40
13	occurs in Figure 3. So these two curves are very	10:39:45
14	much related to each other.	10:39:52
15	Q Figure 6 is illustrating the efficiency	10:39:55
16	of the power supply. Right?	10:39:58
17	A It's over the -- over the range of	10:40:03
18	currents that are defined in Figure 3, correct.	10:40:05
19	Q Is Figure 6 depicting the efficiency of	10:40:07
20	the power supply at a specific or a particular	10:40:15
21	output voltage and current?	10:40:18
22	MR. DAY: Object to form.	10:40:23

1	A	Well, as I said before, I think Figure 6	10:40:26
2		is derived from Figure 3. And Figure 3 is a --	10:40:28
3		you know, it's -- it shows the current, you know,	10:40:38
4		and the -- and the voltage, the output voltage of	10:40:42
5		the DC-to-DC converter is in the top part of	10:40:47
6		Figure 3.	10:40:51
7	Q	Let's go back to Figure 1. And let me	10:40:52
8		know when you're there.	10:41:28
9	A	Okay. I'm there.	10:41:30
10	Q	Figure 1, like Figure 6, is also showing	10:41:32
11		efficiency at the Y axis and output current at the	10:41:40
12		X axis.	10:41:43
13		Is that right?	10:41:44
14	A	Well, they both plot efficiency versus	10:41:48
15		output current. I mean, this is -- you know,	10:41:51
16		Figure 1 is for kind of a I guess an exemplary,	10:41:55
17		just an example of a typical DC-to-DC supply.	10:41:59
18		Whereas I think Figure 6 is the -- perhaps	10:42:02
19		measured by the inventors of the patent. But the	10:42:07
20		Y axis and the X axis are the same.	10:42:10
21	Q	Okay. But if we look at Figure 1, if you	10:42:13
22		change the output voltage, you get a complete	10:42:16

1	different curve, efficiency curve. Right?	10:42:22
2	MR. DAY: Objection.	10:42:24
3	Q That's what -- that's what Figure 1 is	10:42:25
4	showing?	10:42:28
5	A Well, like -- yeah, well, I mean, there	10:42:30
6	are two Figure 1s, right? I mean, there's kind of	10:42:32
7	one at the top and one at the bottom. And the one	10:42:34
8	at the top has different efficiencies than the one	10:42:36
9	at the bottom. And those are corresponding to	10:42:38
10	different output voltages.	10:42:42
11	Q Okay. Do you see the top plot in Figure	10:42:46
12	1, one of the -- one of the efficiency curve	10:42:49
13	corresponds to a Vin of 3.6 volt?	10:42:54
14	A Yes, I see that. That's the top curve.	10:42:59
15	Q Okay. And at the bottom plot of Figure	10:43:01
16	1, there's also a V -- a curve that corresponds to	10:43:05
17	a Vin of 3.6 volt.	10:43:09
18	Do you see that?	10:43:11
19	A Yes, I do. Yes, that's for the 1.3 volt.	10:43:13
20	Q And let's say for example for an output	10:43:17
21	current of 200 milliamp, in the top plot if we go	10:43:21
22	to where Vin is 3.6 volt, that's an efficiency of	10:43:25

1	about 95 percent.	10:43:32
2	Is that right?	10:43:36
3	A True.	10:43:36
4	Q Okay. And in the bottom plot, where 3.6	10:43:37
5	volt is under 90 percent, at 200 milliamp.	10:43:42
6	Is that right?	10:43:45
7	A True, yes.	10:43:48
8	Q Okay. So for the same output current,	10:43:49
9	depending on whether Vout is 3.16 volt as depicted	10:43:55
10	in the top plot or whether Vout is 1.3 volt as	10:44:01
11	depicted in the bottom plot of Figure 1, the	10:44:05
12	efficiency changes. Right?	10:44:08
13	MR. DAY: Objection to form.	10:44:14
14	A The efficiency is different in those two	10:44:15
15	cases.	10:44:16
16	Just to clarify, you know, both Vins are	10:44:16
17	3.6, but the Vouts are different in the two cases,	10:44:20
18	and the current is constant.	10:44:24
19	Q Okay. With that understanding, let's go	10:44:25
20	back to Figure 6.	10:44:29
21	A Okay.	10:44:35
22	Q In Figure 6, this efficiency curve is	10:44:35

1	specific to a particular Vout. Correct?	10:44:42
2	MR. DAY: Object to form.	10:44:48
3	A No, I don't think so. I think this curve	10:44:49
4	is related to -- so once again, I think we have to	10:44:53
5	go back to Figure 3. And what you can see is that	10:44:59
6	there are different currents. Okay? But those	10:45:06
7	different currents, which are on the Y axis in	10:45:11
8	Figure 3, correspond to different Vccs.	10:45:14
9	Now, the Vcc is kind of constant at the	10:45:18
10	beginning, but then it starts to go up quite a bit	10:45:20
11	and it levels out, and then there's the -- there's	10:45:23
12	that transition period where they invoke the	10:45:26
13	bypass switch where you're going to run out of	10:45:28
14	room on the power supply.	10:45:32
15	So the Vout, which is the -- which is Vcc	10:45:33
16	MISO in this -- in this curve, is changing at the	10:45:38
17	same time that the Icc is changing, as the current	10:45:42
18	is changing.	10:45:45
19	So it's not the case that the Vout is	10:45:45
20	constant. That's why the -- that's why Figure 3	10:45:48
21	is kind of important for Figure 6.	10:45:50
22	Q Let's go to Column 4, Line 35. Actually,	10:45:51

1	if you can read Column 4, Line 35 to 56. And let	10:46:57
2	me know when you're done.	10:47:02
3	A Okay. Okay, I've -- I've read 35 through	10:47:07
4	56.	10:48:12
5	Q Okay. The paragraphs you just read talks	10:48:15
6	about power efficiency. Right?	10:48:20
7	MR. DAY: Objection to form.	10:48:24
8	A Yeah, I mean, they talk -- it talks about	10:48:25
9	system efficiency and power supply efficiency. So	10:48:30
10	efficiency in general is discussed in these two	10:48:35
11	paragraphs.	10:48:37
12	Q And for both power supply efficiency and	10:48:37
13	system efficiency, these two concepts are	10:48:41
14	expressed in terms of percentages in these	10:48:49
15	paragraphs. Correct?	10:48:52
16	MR. DAY: Object to form.	10:48:52
17	A In these paragraphs, yeah, they're	10:48:53
18	expressed in these -- as percentages.	10:48:55
19	Q And we just talked about how Figure 1 and	10:48:57
20	6 also express power efficiency in terms of	10:49:06
21	percentages.	10:49:08
22	Do you remember that?	10:49:08

1	A	Yes, I think we discussed -- I think both	10:49:13
2		of us -- figures have percent on the Y axis, yes.	10:49:15
3	Q	Do you recall if the '593 patent anywhere	10:49:21
4		expresses power efficiency in any form other than	10:49:25
5		percentages?	10:49:29
6	MR. DAY:	Object to form.	10:49:30
7	A	Let me review the patent.	10:49:37
8		Well, I think that the, you know -- you	10:50:39
9		know, the patent talks about efficiency in terms	10:50:41
10		of percentages, for sure. But, you know, the --	10:50:46
11		you know, the patent also talks about using -- and	10:50:52
12		I'm just quoting here from the top of Column 4,	10:50:56
13		you know, the power supply circuitry uses a	10:50:59
14		predetermined threshold, further increasing the	10:51:04
15		system efficiency.	10:51:08
16		So the -- you know, they also talk about	10:51:09
17		the use of thresholds to -- built into the	10:51:11
18		circuits in order to increase efficiency. That's	10:51:15
19		not quite the same as literal efficiency, but it's	10:51:17
20		referring to these other threshold mechanisms	10:51:19
21		to -- to improve and to set efficiency. But	10:51:24
22		efficiency is a typical way of expressing	10:51:32

1	efficient -- sorry, percentages are a typical way	10:51:34
2	of quantifying efficiency, for sure.	10:51:36
3	Q But the '593 patent doesn't express power	10:51:50
4	efficiency in any other way other than in the form	10:51:53
5	of percentages. Right?	10:51:56
6	MR. DAY: Object to form.	10:51:59
7	A You know, it talks about, you know,	10:52:01
8	output power exceeds or falls below a certain	10:52:03
9	threshold. But numerical quantification of	10:52:06
10	efficiency is always done in terms of percentages,	10:52:10
11	as far as I can tell.	10:52:11
12	Q Can you go to Claim 8.	10:52:13
13	A Claim 8. Yes. Yes.	10:52:21
14	Q Among other things, Claim 8 --	10:52:34
15	A I'm there.	10:52:37
16	Q -- requires, quote, communication	10:52:39
17	waveform efficiency, end quote. Correct?	10:52:43
18	A It says that, yes. It's programmed based	10:52:47
19	on a communication waveform efficiency.	10:52:50
20	Q What is the meaning of communication	10:52:52
21	waveform efficiency that you apply when analyzing	10:52:54
22	Claims 8 and 13, which also recite the same	10:52:57

1	phrase?	10:53:00
2	A Well, different communication waveforms,	10:53:04
3	you know, levels of power and which vary with	10:53:07
4	time. And I guess the way I interpret this is	10:53:11
5	that, you know, the design of the -- the	10:53:15
6	threshold, I guess they -- in Claim 8 they call it	10:53:21
7	threshold voltage, the choice of that threshold	10:53:24
8	voltage may depend on the type of communication	10:53:27
9	waveform that you're using.	10:53:31
10	Q So I think you just stated that the way	10:53:34
11	you interpret this is that the threshold may	10:54:30
12	depend on the type of communication waveform that	10:54:34
13	you're using.	10:54:37
14	How does efficiency come into play under	10:54:39
15	this --	10:54:43
16	MR. DAY: Objection to form.	10:54:44
17	Q -- under this definition?	10:54:45
18	A Well, you know, different communication	10:54:51
19	waveforms -- so perhaps I can refer to another	10:54:58
20	exhibit here just as an example. And I don't know	10:55:08
21	if you have that as one of your exhibits today.	10:55:11
22	But the Sahu reference that I refer to in -- in my	10:55:14

1	reply.	10:55:20
2	The DC current going through that	10:55:24
3	amplifier will depend on the output power. And	10:55:31
4	the value of that DC current actually depends on	10:55:39
5	the waveform, depends on the communication	10:55:42
6	standards that you're using. Some communication	10:55:47
7	standards might have more DC power, some might	10:55:49
8	have less, depending on, you know, the waveform	10:55:52
9	that you're using.	10:55:54
10	So there's a -- there's a point where the	10:55:55
11	DC-to-DC converter efficiency falls below the	10:56:00
12	efficiency of a constant supply. And there's a --	10:56:07
13	in the Sahu reference there's a point where that	10:56:12
14	crossover occurs.	10:56:15
15	And so that you might consider that,	10:56:18
16	like, a threshold for the bypass, which they're	10:56:20
17	referring to here in Claim -- well, it's in Claim	10:56:23
18	6, and then of course eight is dependent on six.	10:56:30
19	So, you know, so basically that crossover	10:56:33
20	point which is shown in Sahu will depend on the	10:56:40
21	communication waveform that you're using. So Sahu	10:56:43
22	talks about CDMA. But other standards might have	10:56:47

1	a different crossover point. So that's my	10:56:50
2	understanding of what is meant here with -- with	10:56:53
3	this particular part of Claim 8, as with an	10:56:56
4	example.	10:56:59
5	MR. TO: This is a good time for a break.	10:57:21
6	Should we take --	10:57:23
7	THE WITNESS: Sure. Five minutes?	10:57:26
8	MR. TO: Five minutes works, too.	10:57:27
9	VIDEO SPECIALIST: Off the record at	10:57:29
10	10:57.	10:57:31
11	(A recess was taken.)	10:57:31
12	VIDEO SPECIALIST: We are back on the	11:02:56
13	record. The time is 11:03.	11:02:59
14	BY MR. TO:	11:03:04
15	Q Dr. Larson, during the break did you	11:03:05
16	discuss the substance of this deposition with	11:03:07
17	counsel?	11:03:10
18	A No, not at all.	11:03:10
19	Q Can you please open the document marked	11:03:14
20	as Exhibit 3 to your deposition.	11:03:16
21	(Larson Deposition Exhibit 3 marked for	11:03:16
22	identification and is attached to the transcript.)	11:03:16

1	A	Yes.	11:03:19
2		Yes, I have it open.	11:03:38
3	Q	Okay. Can you turn to Column 4, Line 12	11:03:39
4		to 16. Read those lines, and let me know when	11:03:43
5		you're done.	11:03:47
6	A	Column 3, Lines 12 to 16?	11:03:54
7	Q	Actually, strike that.	11:03:57
8		Do you recognize Exhibit 4 as the Hau	11:03:58
9		reference?	11:04:02
10	A	I do, yes.	11:04:03
11	Q	Can you read Column 4, Line 12 to 16, and	11:04:03
12		let me know when you're done, please.	11:04:07
13	A	Yes. I've read it.	11:04:10
14	Q	The portion of Hau you just read states,	11:04:40
15		quote, "The RFin signal 10 is changed to a level	11:04:43
16		such that the circuit of Figure 1 will deliver the	11:04:48
17		optimum, predetermined output power at the Rfout	11:04:52
18		signal 12, which corresponds to the particular	11:04:56
19		RFin signal level."	11:05:00
20		Do you see that?	11:05:01
21	A	Yes, I do.	11:05:02
22	Q	Can you go to Figure 1 of Hau.	11:05:03

1	A	Yes, I'm there.	11:05:15
2	Q	Do you see RFout, and it's marked as	11:05:15
3		RFout 12 in Figure 1?	11:05:25
4		Do you see that?	11:05:27
5	A	I do see that, yes.	11:05:28
6	Q	That's the output of Hau's two-stage	11:05:29
7		amplifier. Correct?	11:05:34
8	A	That's the RF output of that, of that	11:05:35
9		amplifier, yes.	11:05:38
10	Q	So do you understand Hau's optimum output	11:05:39
11		power to be referring to the output power measured	11:05:44
12		at RFout signal 12?	11:05:46
13		MR. DAY: Object to form.	11:05:49
14	A	Do you mean from that sentence in -- or	11:05:53
15		those lines from Column 4 that I just read?	11:05:59
16	Q	That's right.	11:06:01
17	A	Yes, that's the -- the optimal RF output	11:06:03
18		power required by the base station upon turn on,	11:06:08
19		yes.	11:06:11
20	Q	Turn to Figure 4, please.	11:06:12
21	A	Yes, I see it.	11:06:29
22	Q	So the horizontal X axis of Figure 4	11:06:29

1	shows Pout and is expressed in dBm.	11:06:39
2	Do you see that?	11:06:43
3	A Yes, I do.	11:06:44
4	Q Do you understand Pout in Figure 4 to be	11:06:45
5	the output power measured at RFout signal 12 in	11:06:59
6	Figure 1?	11:07:03
7	MR. DAY: Object to form.	11:07:04
8	A Yeah, I believe that Pout dBm in Figure 4	11:07:05
9	is corresponding to the RFout 12 in Figure 1.	11:07:10
10	Q And if you just scroll down below to	11:07:15
11	Figure 5, the X axis in Figure 5 is also Pout.	11:07:18
12	Correct?	11:07:22
13	A Yes, the X axis in Figure 5 is also Pout.	11:07:23
14	Q And Pout in Figure 5 is also the output	11:07:28
15	power of the two-stage amplifier in Hau as shown	11:07:31
16	in RFout signal 12 in Figure 1?	11:07:37
17	A As an example, yes, I believe that's	11:07:41
18	correct.	11:07:42
19	Q Can you open the document marked as	11:07:42
20	Exhibit 4 to your deposition, please.	11:07:48
21	(Larson Deposition Exhibit 4 marked for	11:07:48
22	identification and is attached to the transcript.)	11:07:48

1	A	Yes. I have it here.	11:07:57
2	Q	Do you recognize Exhibit 4 as the Canyon	11:08:20
3		reference?	11:08:24
4	A	Yes, this is the Canyon patent.	11:08:25
5	Q	Okay. Can you read Column 3, Line 1 to	11:08:27
6		42 and let me know when you're done.	11:08:33
7	A	I'm sorry, Line 1 to Line what?	11:09:04
8	Q	Forty-two.	11:09:05
9	A	Forty-two. Thank you. Sorry.	11:09:07
10		Okay, I've read it.	11:10:28
11	Q	Column 3, Line 1 to 42, what you just	11:10:29
12		read, describes Figure 1. Correct?	11:10:32
13	A	Let me ...	11:10:40
14		I mean, it -- I mean, for sure, yes. A	11:10:44
15		lot of the elements that it describes are also in	11:10:48
16		other figures as well. But it certainly is	11:10:50
17		talking about Figure 1.	11:10:52
18	Q	And Column 3, Line 8 states that, quote,	11:10:58
19		"Power management unit 110 includes the current	11:11:06
20		meter 180."	11:11:11
21		Do you see that?	11:11:12
22	A	Yes, I see that.	11:11:14

1	Q	And Column 3, Line 14 to 19 states, I	11:11:14
2		quote, "A current meter 180 monitors/measures the	11:11:20
3		DC current flow of the operating voltage supply	11:11:25
4		Vbb provided to the power amplifier unit 120 and	11:11:28
5		generates a current flow indicator signal X,	11:11:33
6		representative of the measured DC current flow of	11:11:37
7		the operating voltage supply applied to the power	11:11:40
8		amplifier unit 120."	11:11:42
9		Do you see that?	11:11:43
10	A	I do.	11:11:47
11	Q	Do you understand Element 180 of Figure 1	11:11:47
12		to be a current meter?	11:11:50
13	A	Well, let me take a look at the figure.	11:11:56
14		Yeah, it's -- it's in Figure 1, 180 is	11:12:10
15		labeled power meter. But from the text and from	11:12:16
16		its placement, I believe what it's doing is	11:12:21
17		measuring the current, you know, that's supplied	11:12:23
18		to the power amplifier. And I guess from	11:12:29
19		knowledge of Vbb, you could then calculate the	11:12:31
20		power.	11:12:34
21		So, yeah, 180 is certainly measuring the	11:12:37
22		current Vbb, supplied by Vbb.	11:12:40

1	Q	Column 3, Line 20 to 22 states, quote,	11:12:44
2		"By monitoring the current Ibb drawn by the power	11:12:49
3		amplifier unit 120, it is possible to determine	11:12:52
4		the power output of the power amplifier unit 120."	11:12:55
5		Do you see that?	11:12:59
6	A	That's what it says. I see it.	11:13:00
7	Q	Canyon doesn't disclose how you can	11:13:04
8		determine power output of the power amplifier unit	11:13:09
9		120 based on current Ibb alone. Right?	11:13:11
10		MR. DAY: Object to form.	11:13:14
11	A	Well, you know, a little later in that	11:13:17
12		same column it says, you know, by monitoring the	11:13:35
13		current Ibb drawn by the power amplifier, it is	11:13:37
14		possible to determine the power output of the	11:13:40
15		power amplifier.	11:13:42
16		So I guess, you know, Canyon does talk	11:13:45
17		about how using Ibb would allow you to determine	11:13:49
18		the output power of the power amplifier.	11:13:52
19	Q	So Canyon says that it's possible to	11:13:54
20		determine the power -- the power output of the	11:13:59
21		power amplifier unit 120 based on Ibb, but it	11:14:02
22		doesn't tell you how. Right?	11:14:06

1	MR. DAY: Object to form.	11:14:09
2	A Well, I mean, I think a person of	11:14:10
3	ordinary skill in the art would understand that	11:14:13
4	that's a pretty straightforward thing to do,	11:14:15
5	especially since you would also know Vbb at the	11:14:18
6	same time. So I guess I'd have to go through it.	11:14:21
7	I don't see a detailed description of how you	11:14:24
8	would calculate that, but it's well-understood by	11:14:26
9	a person of ordinary skill in the art how you	11:14:30
10	would.	11:14:31
11	Q So you mentioned that it would be	11:14:38
12	straightforward because you would also know Vbb at	11:14:46
13	the same time. Do you need Vbb to determine the	11:14:51
14	output power?	11:14:54
15	MR. DAY: Object to form.	11:14:55
16	A Well, it's a good question. And, you	11:14:57
17	know, I think not -- I think the simple answer to	11:15:01
18	your question is, you know, the '583 patent, which	11:15:07
19	we were looking at a little bit earlier, and I	11:15:09
20	guess we saw Figure 3, and, you know, Figure 3 had	11:15:11
21	this plot of, you know, current, which would be	11:15:15
22	Ibb in this case, as a function of output power.	11:15:19

1	So, like, the '583 patent has a very nice example	11:15:24
2	of how you could use the current all by itself to	11:15:27
3	determine the output power. So that's just one	11:15:29
4	example. But there could be others as well. I	11:15:32
5	think Hau also has a similar kind of a curve.	11:15:37
6	Q But Canyon doesn't have anything like	11:15:48
7	that. Right?	11:15:50
8	MR. DAY: Object to form.	11:15:50
9	A I don't believe Canyon has a -- has a	11:15:52
10	curve like that. And as I said, I think that's	11:15:54
11	something a person of ordinary skill in the art	11:15:57
12	would understand very well.	11:15:59
13	Q Can you open a document marked as Exhibit	11:16:05
14	5 to your deposition.	11:16:14
15	(Larson Deposition Exhibit 5 marked for	11:16:14
16	identification and is attached to the transcript.)	11:16:14
17	A Yes. I have it open.	11:16:17
18	Q Do you recognize Exhibit 5 as the Ranjan	11:16:33
19	reference?	11:16:38
20	A I do.	11:16:38
21	Q Can you turn to Figure 3 on Page 2?	11:16:39
22	A Yes, I have it here.	11:16:52

1	Q	So the horizontal X axis of Figure 3 is	11:16:53
2		Pout, and it's expressed in dBm. Correct?	11:17:02
3	A	Correct.	11:17:05
4	Q	And if you look at the description of	11:17:05
5		Figure 3 just below Figure 3 itself it states,	11:17:10
6		quote, "Measured efficiency of amplifier with	11:17:16
7		constant Vdd and with DC-DC converter at different	11:17:19
8		output power levels."	11:17:25
9		Do you see that?	11:17:26
10	A	Yes.	11:17:28
11	Q	Do you understand Pout in Figure 3 to be	11:17:29
12		referring to the output power of the power	11:17:35
13		amplifier?	11:17:38
14	A	Yes, I think that's the output power of	11:17:41
15		the power amplifier that's being measured in this	11:17:43
16		paper.	11:17:45
17	Q	Can you turn to Figure 1A on Page 1.	11:17:47
18	A	I see it, yes.	11:18:03
19	Q	Does Figure 1A depict any bypass switch	11:18:04
20		or bypass circuitry?	11:18:11
21		MR. DAY: Object to form.	11:18:14
22	A	I don't believe Figure 1A depicts a	11:18:17

1	bypass switch. It has a generic DC-to-DC	11:18:22
2	converter which could have a bypass switch, but	11:18:29
3	it's not referred to in the paper, as far as I	11:18:31
4	know.	11:18:33
5	Q So you just said that a bypass switch is	11:18:33
6	not referred to in the paper. And I assume	11:18:45
7	"paper" means Ranjan, the Ranjan paper. Right?	11:18:48
8	A That's correct, yes. And, you know, I	11:18:52
9	don't see a reference to a bypass switch in the	11:19:00
10	paper, in the Ranjan paper.	11:19:02
11	Q Can you open the document marked as	11:19:08
12	Exhibit 6 to your deposition.	11:19:09
13	(Larson Deposition Exhibit 6 marked for	11:19:09
14	identification and is attached to the transcript.)	11:19:09
15	A Yes. I have it open.	11:19:17
16	Q Do you recognize Exhibit 6 as the Sahu	11:19:30
17	reference?	11:19:36
18	A Yes, I do.	11:19:37
19	Q Can you turn to Figure 2 of Sahu on Page	11:19:38
20	114, please.	11:19:42
21	A I see it, yes.	11:19:46
22	Q Does Figure 2 include a bypass switch or	11:19:47

1	a bypass circuitry?	11:19:56
2	A Figure 2 has lots of, you know, boxes in	11:20:04
3	it. There's a box labeled DC-to-DC converter.	11:20:08
4	You know, that could have a bypass switch in it,	11:20:12
5	but I don't see any reference to a bypass switch	11:20:14
6	in the figure.	11:20:16
7	Q In Figure 3 on Page 115, does Figure 3	11:20:23
8	include a bypass switch or bypass circuitry?	11:20:28
9	A So the Figure 3A and 3B both have blocks	11:20:39
10	labeled DC-to-DC converters. And as I said	11:20:47
11	before, you know, there could be a bypass switch	11:20:49
12	within those. But it's not labeled as such.	11:20:52
13	Q Does Figure 4 on Page 116 include any	11:20:57
14	bypass switch or bypass circuitry?	11:21:06
15	MR. DAY: Object to form.	11:21:09
16	A So Figure 4 is a detailed	11:21:16
17	transistor-level, you know, block diagram of a	11:21:20
18	synchronous but boost converter, you know, and its	11:21:26
19	kind of operation. And there's no -- there's no	11:21:29
20	bypass switch.	11:21:32
21	Although I do note that M1 could be used	11:21:33
22	as a bypass switch under an appropriate control	11:21:35

1	regimen. But the -- I don't believe that the	11:21:38
2	paper mentions that.	11:21:40
3	Q You mentioned a couple of times, with	11:21:43
4	respect to the figures of Sahu that we just looked	11:21:48
5	at, that a bypass switch could be included in the	11:21:53
6	DC-to-DC converter. Just so we're clear, Sahu	11:21:57
7	doesn't mention a bypass switch at all. Right?	11:22:02
8	MR. DAY: Object to form.	11:22:06
9	A I think as I -- as I stated previously, I	11:22:07
10	mean it could be in there, but I don't -- I don't	11:22:10
11	believe that it's mentioned in the paper.	11:22:12
12	MR. TO: I have no further questions for	11:22:35
13	the witness.	11:22:37
14	MR. DAY: Could we take maybe five	11:22:40
15	minutes. I don't know if I'm going to have any	11:22:42
16	redirect, but, actually, if we can take five or	11:22:44
17	ten I'll just look very briefly and see if I have	11:22:47
18	any followup.	11:22:49
19	MR. TO: Okay.	11:22:50
20	VIDEO SPECIALIST: Going off the record	11:22:51
21	at 11:23.	11:22:52
22	(A recess was taken.)	11:22:54

1	VIDEO SPECIALIST: We are back on the	11:27:32
2	record. The time is 11:27.	11:27:37
3	EXAMINATION BY COUNSEL FOR PETITIONER	11:27:45
4	BY MR. DAY:	11:27:45
5	Q All right. Dr. Larson, at the time that	11:27:46
6	you provided your reply declaration, had the	11:27:50
7	District Court issued a claim construction order	11:27:57
8	yet?	11:27:58
9	A No, they had not.	11:28:00
10	MR. TO: Objection. Form. Scope.	11:28:01
11	Q Was an order issued since you provided	11:28:04
12	your reply declaration?	11:28:07
13	A I believe it was, yes.	11:28:08
14	Q And if you look at the set of printed	11:28:09
15	documents you have to your right, is Exhibit 1037	11:28:14
16	in that set of exhibits?	11:28:19
17	A Yes, it is.	11:28:26
18	(Exhibit 1037, previously marked, not	11:28:26
19	attached.)	11:28:26
20	Q I am going to ask you to turn -- do you	11:28:26
21	recognize Exhibit 1037 as a claim construction	11:28:31
22	order issued in the related Western District of	11:28:33

1	Texas case involving the '593 patent?	11:28:37
2	A Yes, I do recognize that.	11:28:41
3	Q And can you turn to Page 35 of Exhibit	11:28:42
4	1037, please.	11:28:48
5	A Yes, I have it here.	11:28:50
6	Q Does that page fall within the court's	11:28:51
7	discussion of the term "power efficiency" in the	11:28:55
8	'593 patent?	11:28:57
9	A Yes, it does. This -- this page refers	11:29:00
10	to the term "power efficiency."	11:29:03
11	Q Do you see on that page there's a heading	11:29:07
12	that begins with the word "third" in bold italics?	11:29:09
13	A Yes, I see that.	11:29:15
14	Q And in the third sentence of that	11:29:15
15	paragraph beginning with "third" in bold italics,	11:29:21
16	there is a sentence that states, "How power	11:29:26
17	efficiency is measured is outside of the scope of	11:29:29
18	the term."	11:29:31
19	Do you see that?	11:29:32
20	A Yes, the sentence literally says, "How	11:29:33
21	power efficiency is measured is outside the scope	11:29:36
22	of the term."	11:29:39

1	Q	What impact, if any, does that analysis	11:29:39
2		from the court have on your interpretation of the	11:29:44
3		term "power efficiency"?	11:29:51
4	MR. TO:	Objection. Form.	11:29:55
5	A	Yeah, it really has no impact. And I	11:29:56
6		think the next sentence there says, you know, the	11:29:59
7		language of Claim 9 also does not specify how	11:30:01
8		power efficiency should be measured. And so I	11:30:03
9		think that my interpretation of that term is very	11:30:07
10		consistent with that language.	11:30:10
11	Q	Counsel asked you some questions about	11:30:15
12		the current meter in -- I'll start again.	11:30:17
13		The Canyon reference, which I believe is	11:30:27
14		Exhibit 1011, counsel asked you some questions	11:30:30
15		about the current meter power meter 180.	11:30:34
16		Do you recall that?	11:30:39
17	A	Yes, I do.	11:30:41
18	Q	And I think you were asked a question	11:30:42
19		about, you know, whether a person of ordinary	11:30:47
20		skill in the art would know how to determine power	11:30:50
21		from the current meter.	11:30:52
22		Is that right?	11:30:57

1	A	Yes, I sort of remember that. Yes.	11:31:00
2	Q	So I'd also like to take a look at Figure	11:31:03
3		10 in Canyon.	11:31:11
4	A	Okay, I have it here in front of me.	11:31:22
5	Q	And what is Figure 10 in Canyon?	11:31:24
6	A	Well, Figure 10 is a flow chart which	11:31:27
7		basically describes how to adjust the operating	11:31:31
8		voltage applied to the -- to the power amplifier	11:31:34
9		based on a control signal.	11:31:38
10	Q	And what is Step 1004 in that flow chart?	11:31:41
11	A	Step 1004 says, Measure the current flow	11:31:45
12		to the power amplifier unit.	11:31:49
13	Q	And then how is that current flow used in	11:31:53
14		the remaining steps of the flow chart?	11:31:56
15	A	Well, let me just -- let me just -- after	11:31:58
16		the step that you mentioned, then the next step	11:32:04
17		is, Output current flow signal indicative of	11:32:06
18		measured current flow.	11:32:10
19		And then the next step says, Look up	11:32:11
20		value corresponding -- Look up the corresponding	11:32:14
21		value to the current flow signal. And then,	11:32:15
22		Generate control signal based on the corresponding	11:32:17

1	value. And then, Adjust the operating voltage	11:32:21
2	applied to power amplifier unit based upon the	11:32:23
3	control signal.	11:32:26
4	This flow chart describes measuring the	11:32:27
5	current flow to the power amplifier unit and then	11:32:29
6	adjusting the power amplifier itself -- sorry,	11:32:31
7	adjust the operating voltage applied to that power	11:32:37
8	amplifier based on that control signal.	11:32:39
9	Q So would that figure and the accompanying	11:32:42
10	description in Canyon provide some description of	11:32:47
11	how to determine power from a current meter on top	11:32:51
12	of knowledge one of skill in the art would already	11:32:57
13	have?	11:33:00
14	A Yes, this --	11:33:00
15	MR. TO: Objection. Form. Sorry.	11:33:02
16	Objection form, leading.	11:33:04
17	A I guess all I would say is this flow	11:33:05
18	chart is an example of how you would use that,	11:33:07
19	that circuit. But it's -- it's something that --	11:33:10
20	this particular flow chart is something that's	11:33:15
21	very well-understood by anyone, a person of	11:33:17
22	ordinary skill in the art.	11:33:19

1	Q	We did just talk about Figure 10. But in	11:33:21
2		your opinion, would a person of ordinary skill in	11:33:24
3		the art actually need to look at that to	11:33:26
4		understand how to determine power from a current	11:33:28
5		meter such as the current meter 180 in Figure 1 of	11:33:30
6		Canyon?	11:33:34
7	A	Yes, I mean, this flow chart --	11:33:36
8		MR. TO: Objection. Form.	11:33:38
9	A	Yeah, I mean, this flow chart, which is	11:33:39
10		Figure 10, is just -- would be very, very	11:33:41
11		commonsense and obvious for a person of ordinary	11:33:45
12		skill in the art. It's basically saying	11:33:47
13		measure -- measure the current and then adjust the	11:33:49
14		operating voltage appropriately.	11:33:52
15		MR. DAY: All right. I have nothing	11:33:56
16		further.	11:33:57
17		MR. TO: Nothing from me. That's all.	11:34:17
18		VIDEO SPECIALIST: Then this will mark	11:34:19
19		the end of the deposition of Dr. Lawrence E.	11:34:20
20		Larson. We're going off the record at 11:34.	11:34:22
21		(Off the record at 11:34 a.m. EST.)	
22			

ACKNOWLEDGMENT OF DEPONENT

I, LAWRENCE E. LARSON, Ph.D., do hereby
acknowledge that I have read and examined the
foregoing testimony, and the same is a true,
correct and complete transcription of the
testimony given by me, and any corrections appear
on the attached Errata sheet signed by me.

(DATE)

(SIGNATURE)

C E R T I F I C A T E

I, Debra Ann Whitehead, E-Notary Public in and for
the Commonwealth of Virginia, do hereby certify:

That LAWRENCE E. LARSON, Ph.D., the
witness whose deposition is hereinbefore set forth,
was duly sworn by me before the commencement of such
deposition and that such deposition was taken
virtually and is a true record of the testimony
given by such witness.

I further certify that the adverse party,
MEDIATEK, INC., was represented by counsel at the
deposition.

I further certify that the deposition of
LAWRENCE E. LARSON, Ph.D., occurred virtually, on
Tuesday, December 9, 2025, from 10:04 a.m. to 11:34
a.m. EST.

1 I further certify that I am not related to
2 any of the parties to this action by blood or
3 marriage, I am not employed by or an attorney to any
4 of the parties to this action, and that I am in no
5 way interested, financially or otherwise, in the
6 outcome of this matter.

7
8 IN WITNESS WHEREOF, I have hereunto set my
9 hand this 10th day of December, 2025.

10
11 My commission expires:

12 October 31, 2027

13
14 A handwritten signature in dark ink, appearing to read "Lawrence E. Larson", is written over a dashed horizontal line.

15
16 E-NOTARY PUBLIC IN AND FOR THE
17 COMMONWEALTH OF VIRGINIA

18
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C E R T I F I C A T E

I, Debra Ann Whitehead, E-Notary Public within and
for the Commonwealth of Virginia, do hereby certify:

That I was the officer before whom the
deposition of LAWRENCE E. LARSON, Ph.D., was taken on
Tuesday, December 9, 2025, in the matter of MEDIATEK,
INC., v PARKERVISION, INC., Case IPR2025-00030.

I further certify that I have enclosed and
sealed in the envelope to which I have affixed this
certificate all the evidence, notices, and paper
exhibits offered in that deposition.

IN WITNESS WHEREOF, I have hereunto set my
hand this 10th day of December, 2025.

My commission expires:

October 31, 2027



E-NOTARY PUBLIC IN AND FOR THE
COMMONWEALTH OF VIRGINIA

A			
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