# In the Matter Of:

Quasar Science vs Colt International Clothing

IPR2023-00613 and IPR2023-00614

---

## GARY ALLEN, PH.D.

*April 19, 2024*

---

ESQUIRE
DEPOSITION SOLUTIONS

*800.211.DEPO (3376)*
*EsquireSolutions.com*

QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE
PATENT TRIAL AND APPEAL BOARD

---

QUASAR SCIENCE LLC,
Petitioner,
v.
COLT INTERNATIONAL CLOTHING, INC. d/b/a COLT LED,
Patent Owner.
Case: IPR2023-00613
U.S. Patent No. 10,411,582
Case: IPR2023-00614
U.S. Patent No. 10,566,895

---

DEPOSITION OF
GARY ALLEN, Ph.D.

APRIL 19, 2024
9:00 a.m.

1144 15th Street, Suite 3300
Denver, Colorado
Michele Koss, RMR, RPR



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

APPEARANCES OF COUNSEL

On Behalf of the Petitioner
HEATH J. BRIGGS, ESQ.
GREENBERG TRAURIG
1144 15th Street, Suite 3330
Denver, Colorado 80202
303-685-7418
briggsh@gtlaw.com

On Behalf of the Patent Owner
DAVID L. HOFFMAN, ESQ.
NOLAN HEIMANN LLP
Nolan Heimann LLP
16000 Ventura Blvd., Suite 1200
Encino, CA 91436
818-946-1158
dhoffman@nolanheimann.com



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

INDEX OF EXAMINATION

WITNESS: GARY ALLEN, Ph.D.

EXAMINATION PAGE
By Mr. Briggs 4
By Mr. Hoffman 125



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

DEPOSITION OF GARY ALLEN, Ph.D.

April 19, 2024

GARY ALLEN, Ph.D.,

having been first duly sworn, testified as follows:

CROSS-EXAMINATION

BY MR. BRIGGS:

Q Good morning, Dr. Allen. How are you today?

A Good.

Q So my name is Heath Briggs. I am a patent attorney with the law firm of GreenbergTraurig. We represent the Petitioner, Quasar Science, in this matter.

Do you understand that you are here for a deposition in connection with two Inter Partes review proceedings before the U.S. Patent and Trademark Office?

A Yes.

Q And those are called Inter Partes reviews or IPRs.

Do you understand that term?

A Yes.

Q If I use the term IPR, you know that I am referring to Inter Partes reviews?

A Yes.

Q For the record, those matters are IPR2023-00613 and IPR2023-00614.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

So I was going through your CV, and it looks you have been deposed before; is that correct?
A Yes.
Q About how many times?
A Four times.
Q Have those all been in connection with patent proceedings?
A Yes.
Q Were any of those patent proceedings related to --
A I should correct that. One was a class-action suit.
Q So one class-action suit deposition?
A Yes. I believe the other three were patent related, as I recall, yes.
Q Okay. And any of those recently?
A About a year ago, a year and a half maybe.
Q Any of those related to LED lighting?
A All.
Q All of them related to LED lighting?
A Yes.
Q Were any of them related to lighting in connection with film or movie production?
A No.
Q Okay. Since you have been deposed before,



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

you probably understand how this works, but I am going to go over the ground rules again.

A Okay.

Q So I am going to ask you a bunch of questions today about your declarations that you have submitted in these proceedings. I will do my best to ask a clear question and I do ask that you do your best to provide a clear answer.

We have our court reporter sitting here, so it is really important that we don't talk over each other. So I am also going to try to not interrupt you while you are providing an answer. And I would ask that you please also do your best to not interrupt me while I am asking a question.

Is that okay?

A Understood.

Q I see that you are shaking your head right now.

A Do not do that.

Q Yes. Please answer with a verbal yes or no or however you want to answer. Head shakes yes or no are not captured by the transcript.

A Okay. Okay.

Q So Mr. Hoffman has probably already explained this to you. He is allowed to object on the



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

record but, unless he instructs you not to answer, you are required to answer my question. Understood?

A Okay.

Q So I don't know what you have done in prior depositions, but I typically take a break every sixty minutes.

Does that work for you?

A That is good.

Q All I ask is, if there is a pending question, that you answer the question before we go on break.

Is that okay?

A Yes. Yes.

Q Okay. And I think Mr. Hoffman has probably also explained this to you, that you are not allowed to talk about the substance of your testimony today during my cross-examination and during any breaks, okay?

A Understood.

Q That means until I have concluded my cross-examination, you and Mr. Hoffman cannot talk about the substance of the case, okay?

A Yes. Understood.

Q And the court reporter just swore you in as we just heard. So you are required to testify truthfully today.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Do you understand that?
A Yes.
Q Is there any reason that you cannot testify truthfully here today?
A No, not at all.
Q You are not on any medications or anything like that that would prevent you from testifying truthfully?
A No.
Q You are not on any medication?
A No, I am not on any medication that would prevent me from testifying truthfully.
Q Okay. Dr. Allen, I am going to give you copies of your declarations. So the first one is from IPR2023-00613. The second one is from IPR2023-00614.
A Okay. Thanks.
MR. BRIGGS: Do you want copies?
MR. HOFFMAN: Yes, please.
Q So can you please look at Exhibit 2080 from IPR2023-00613.
A Exhibit 2080 is this?
Q So if you look at the bottom of the page, do you see how there are exhibit numbers listed there? You have Exhibit 2080.
And the other document, if you can look at



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

the other document real quick, that is also 2080. So we are going have to be clear on which IPR we are talking about. If you look at the middle of the front page, you can see an IPR number.

Do you see that?

A Yes, 613.

Q And that one is?

A 614 so.

Q You have two different declarations and that is because we have two different IPR proceedings?

A Yes.

Q I looked at both of these declarations and they seem nearly identical to me except for some changes obviously due to changes in the wording of the claims and patent numbers but, other than that, the majority of the substance of the testimony appears to be basically the same between the two.

Is that your understanding as well?

A Yes.

Q Okay. So let's just work off the '613, Exhibit 2080, for the majority of the proceedings. If you want to put that other one aside so we don't accidentally grab it for now.

A Okay.

Q Thank you. So can you please go to page 73



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

of your declaration.

For the record, when I say "your declaration,"or "Mr. Allen's declaration," I am referring to Exhibit 2080.

A Yes.

Q So at the bottom of that we see a signature?

A Yes.

Q For Gary R. Allen, right?

A Yes.

Q Is that your signature?

A It is.

Q Okay. Thank you.

I guess we should do that also for the '614. If you can go to page 74 of that document, please.

A Okay. Yes, that is my signature.

Q Same signature, right?

A Yes.

Q So, again, these are your declarations then, correct?

A Correct.

Q Okay. Thank you.

So did you prepare for the deposition today?

A Yes.

Q How so?

A Reviewing my declaration and all of the



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

prior art and any other documents that are cited in my declaration.

Q So when you say "all of the prior art," do you mean documents like, if I said Hasnain, would you know what document I am referring to?

A Yes.

Q Did you prepare with anybody else for the deposition?

A Of course some discussions with David Hoffman, the usual, reviewing the content of the declaration, the issues in the patents and the prior art, just sort of review.

Q Okay. Did you review the patent owner's response as part of your preparation?

A I don't recall reviewing that.

Q Okay. Did you review Mr. Holmes' declaration as part of --

A Yes.

Q -- your preparation?

A Yes. Yes.

Q Okay. Let us try to, I will ask a question and then if you can just hold on a second, because she is trying to catch your answers but you are answering in the middle of my question.

A I am sorry.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Q Did you prepare with anybody besides Mr. Hoffman for the deposition?
A No.
Q You didn't speak to any colleagues or anything about the case?
A No.
Q Okay. So let's look at the front page of Exhibit 2080, please.
A Okay.
Q On the front page there are two parties listed, correct, the first is -- excuse me. I will start that question again.
I will also go to the front page. So if we are looking at the front page of Exhibit 2080, in the middle of the page we see a company called Quasar Science, LLC, Petitioner, correct?
A Yes.
Q And below that we see Colt International Clothing, Inc. d/b/a Colt LED, Patent Owner, correct?
A Yes.
Q Are you familiar with either of these companies?
A I am familiar with Colt, and only peripherally familiar with Quasar.
Q How are you familiar with Colt?



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A I have done prior declarations with Mr. Hoffman, reexams for other IP for Colt. So I am familiar with their technology at that level.

Q So you put in a declaration in a reexamination proceeding for Colt?

A Yes.

Q Do you happen to know which proceeding that is or if it is listed in your CV?

A Is it listed in my CV?

Q Let us go back to the back of Exhibit 2080, page 80.

Here we see expert witness experience at the top of the page, correct?

A Yes. I have not updated this to include that Colt reexam.

Q Okay. I was going to ask this anyway.

When was the last time this was updated?

A It would have been roughly 2022. Looking down through here, that is the only expert witness experience that is not included.

Q So I should understand page 80 of Exhibit 2080 to have all of your experience as an expert witness except for the Colt reexamination; is that correct?

A That is the way it appears. I believe that is true.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Q Okay.
A I can provide the details of that reexam during the break, if that is acceptable.
Q We will ask for a copy of that declaration since it was not provided to us in advance.
A Okay.
Q And it directly relates to this proceeding?
A Sure.
Q Do you recall what your testimony was, in general, in that reexamination?
A It was regarding technical aspects of the suitability for commercial image recording, especially as regards to color quality.
So the requirements for high CRI, for low green, what sorts of lumen penalties those requirements have on an LED, topics similar to what is in this IP.
Q Do you recall if there is any inconsistencies in that reexamination testimony versus what is in your testimony in this Exhibit 2080?
A I didn't review that declaration in preparation for this, but I don't suppose there would be any inconsistency.
MR. BRIGGS: I would like to get a copy of that reexamination, at a minimum over the break, so I can review it during the break, please, Mr. Hoffman.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

MR. HOFFMAN: Sure.
MR. BRIGGS: Thank you.
Q Let us move on. You said you are familiar with Colt, and that is because you also had put in an expert declaration in one of the reexamination proceedings; is that correct?
A Yes.
Q Any other ways that you are familiar with Colt?
A No.
Q Okay. And you see there is two companies here, Colt International Clothing, Inc. and Colt LED? Do you see that?
A Yes.
Q If I say Colt today, you will understand that I am referring collectively to those two companies?
A Yes.
Q You said that you are peripherally aware of Quasar Science, LLC?
A Yes.
Q What do you mean by that?
A Only that they are providing products similar to Colt's products for commercial image recording.
Q So you are aware of Quasar Science, LLC



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

because they provide products similar to the products that Colt provides?

A Yes.

Q What similar products?

A For what I would call stage lighting or commercial image recording applications.

Q Any specific products in mind?

A No.

Q Okay. Do you know what the term bicolor means in relation to those products?

A Yes.

Q Were the products bicolor products by chance?

A Are you asking about Quasar products?

Q The products that you are familiar from Quasar, were those products bicolor products?

A I am not familiar with the specifics, only that they are similar to Colt's products.

Q Fair enough.

Do you know any employees or officers of Quasar Science, LLC?

A No.

Q Do you know any employees or officers of Colt?

A No.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Q So let's go back to your declaration, Exhibit 2080, and if you can please go to page 75.
Are you there?
A Yes.
Q Great. So it looks at the top we have Gary R. Allen, Ph.D.
That is you, correct?
A Yes.
Q Would you prefer if I call you Dr. Allen today or something else?
A Dr. Allen is fine.
Q Great. This looks to be your CV or resume, is that correct, starting on page 75?
A Yes.
Q Do you prefer it to be referred to as a CV or resume or does it matter?
A It does not matter.
Q I am going to call it a CV.
In your CV you have your education listed first, correct?
A Yes.
Q It looks like you have a Ph.D in astrophysical sciences in 1980 and corresponding master's of astrophysical sciences in 1977 from Princeton, correct?



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A Yes.
Q Then you went to Penn State, it looks like, and graduated with a bachelor's degree in nuclear engineering and engineering science in 1974, correct?
A Yes.
Q And then later in 1975 you graduated from Penn State with a master's in nuclear engineering?
A Correct.
Q And then below your education you have experience listed; is that right?
A Yes.
Q And let's turn the page and go to page 76 of Exhibit 2080.
A Yes.
Q And it looks like the majority of your career was spent in or at GE Lighting, from 1987 to 2016; is that right?
A Yes.
Q Okay. But before that you were a research physicist for Sylvania Lighting?
A Yes.
Q It looks like you have a listing of patents that follows your experience; is that right?
A Correct.
Q Here it says 92 count, correct?



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A Yes.
Q So is this list up-to-date?
A Yes.
Q Okay. It looks like several of these patents are in relation to LEDs; is that right?
A Yes.
Q Do you know how many, approximately, are related to LEDs as opposed to fluorescent or other types of lighting devices?
A 46.
Q Wow, right off the top. Good job. You pass.
Are any of those 46 patents related to, I think you have been using the term commercial image recording quality LEDs or lighting systems for those?
A Yes.
Q Do you know which ones?
A The titles sometimes are not descriptive enough for me to be certain.
Q Okay.
A There were several patents related to a PAR 38 lamp that I invented and we commercialized at GE Lighting and is used for commercial image recording, as well as other commercial applications.
I believe that the patents related to that



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

PAR, meaning parabolic aluminized reflector, I believe the patents related to the PAR are 8,608,347, 8,613,530, and that may be it for that particular lamp.

Q So you call that a PAR 38?

A PAR 38 and 30. Those are the diameter sizes.

Q In inches?

A They are an eighth of an inch.

Q And PAR stands for parabolic aluminized --

A Parabolic aluminized reflector. That is a standard term in the lighting industry.

Q Okay. How do those two patents relate to commercial image recording?

A Again, I want to emphasize the caveat that I am not certain that those two are the right patents based on the titles. The way that they are related to commercial image recording is that they have the same requirements for color quality, uniform distribution, uniform color, long-life hybrid liability, high efficacy and, in fact, they are used in stage settings.

The most challenging aspects of developing that first ever lamp of that type when LEDs were still inefficient as they were at the time of this invention was doing thermal management. So in those ways both the color quality and the thermal management and the



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

application space require reliability, stability of the output matches the demands of commercial image recording.

Q Aside from those two, and with the caveat that those may not be the exact works, are there any other patents that I should know about that relate to commercial image recordings specifically?

A Half of the patents are related to LED. It depends on how specific we want to ask the question, are they related?

Q I will reask it then.

Designed specifically for use in TV or film production?

A Only the PAR lamps.

Q Okay. Thank you.

So you do have quite a few patents, and congratulations on that.

A Thank you.

Q Were you ever a member of a patent committee or similar when you were employed at GE?

A Yes.

Q Okay. You do understand what patent law is then?

A I am not an attorney. I try to understand the parts that I need.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Q Okay. Because you have an opinion in here about what is patentable versus not patentable. I don't see any section in here about your understanding of patent law.

A Can you tell me where it is that I have opined on what is patentable?

Q You have said a lot of things would not have had a reasonable expectation of success, which is a phrase commonly used in the context of whether something would be patentable or not.

A Okay.

Q That is one of many things. You say novel and obviousness, but I don't see a section in here on patent law standards.

Did I miss it or is there a section on patent law standards?

A We did not include what is meant by obviousness and so on.

Q What is your understanding of anticipation in the context of U.S. patent law?

MR. HOFFMAN: Objection. Calls for a legal conclusion.

Q You can answer.

A Must I answer?

Q Yes.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A Okay. Anticipation, and I am not going to use the proper language, but it is a situation where a single piece of prior art provides all of the elements in a claim without relying on other prior art in combination.

Q Okay. What is the standard for obviousness?

A The standard for obviousness, again, I don't have the legal language, but it is such that a POSITA would be able to put together in effect the invention based on what is taught in the patent.

Q By POSITA, for the record, we mean a person of ordinary skill in the art, correct?

A Yes.

Q And we are going to call that P-O-S-I-T-A for the court reporter.

In your review of the prior art provided in the 2023-00613 IPR, did you study any standards for obviousness before you provided your opinion?

A The way that you have asked it, no, I did not study any standards.

Q Did you rely on your past experience on obviousness in applying your opinions then?

A Yes.

Q What type of past experience?

A Having been deposed on, as I recall, three



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

patent related or patent infringement related cases, I have been coached and provided the legal language around obviousness.

Q Okay. Do you know what enablement means in the context of patent law?

MR. HOFFMAN: Objection. Relevance and legal conclusion.

A I have not been asked to opine on enablement in this case.

Q My question is, do you know what it means?

A I can paraphrase, again without the legal language, that enablement has to do with the contents of the patent, as the word says, enabling a POSITA to build and reproduce the results of the patent.

Q Okay. Have you ever been asked to arrange lighting for a TV or movie studio?

A No.

Q Have you ever planned a lighting arrangement for a commercial image recording?

A No.

Q Have you ever designed any set lighting?

A Would you specify or clarify what that means?

Q TV set or movie set lighting. Have you ever designed the layout of any TV or movie set lighting?



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A The layout, no.
Q Okay. Have you ever worked as a gaffer?
A No.
Q All right. Let's go back into your declaration and go to paragraph 1, which is at page 2 of Exhibit 2080.
A Okay.
Q So the top of this says, Declaration of Gary R. Allen Ph.D in support of patent owner's response, correct?
A Yes.
Q How did you prepare this declaration?
A It was prepared iteratively. Mr. Hoffman described to me which issues he wanted me to opine on.
I read thoroughly both patents, all of the prior art, the related documents and started to form my opinions which I wrote down as a draft declaration.
Iteratively after that Mr. Hoffman, of course, applied layers of legal structure to it and then there was editing after that to get to the fine points.
Q Did you work with anybody else in preparing your declaration?
A No.
Q Okay. So let look at paragraph 2 of your declaration, please. Read that and let me know when you



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

are ready.
A My compensation --
Q I am sorry. Read it to yourself. I apologize. If I say please read it today, you can assume I mean read it to yourself.
A Okay. Yes, I have done that.
Q You say, My compensation is in no way contingent on the nature of my findings, the presentation of my findings in testimony, or the outcome of this or any other proceeding. I have no other interest in this proceeding. Correct?
A Correct.
Q So you have no financial interest in Colt?
A Correct.
Q You don't own any stock in Colt?
A No.
Q You don't have any family members who work for Colt?
A No.
Q Okay. If you can look at paragraph 4 of your declaration then, please.
A Okay.
Q Just read that and let me know when you are ready.
A Okay.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Q So it looks like you have a lot of experience with LED lamps, but I don't, what I don't see here is experience with commercial recording imaging, correct?

A The LED lamps and luminaires includes those PAR lamps which are used in stage and studio applications, commercial imaging recording applications and have the same very demanding requirements on color, reliability and thermals as the products in this case. So that term encompasses what you are asking.

Q Okay. Let us go to paragraph 8 of your declaration, please. Why don't you go ahead and read that whole paragraph and then I will ask you some questions.

A Okay.

Q So about three lines it says that the patent was issued to Guillermo Macias.

Do you see that?

A Yes.

Q Do you know Mr. Macias?

A No.

Q So you have never met him?

A No.

Q You never spoke to him on the phone?

A No.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Q You never exchanged any emails with him?
A No.
Q Text messages?
A No.
Q No communications whatsoever?
A No communications whatsoever.
Q Okay. So read paragraph 9 of your declaration on page 6 and let me know when you are ready.
A Okay.
Q Here is one of the reasons that I asked what your experience was, because you have been retained to opine on certain questions related to ground one which it starts, and there is a bunch of claims, and would have been obvious based on some prior art references; and then you also say would have been obvious based on Kit in view of Iamiro, Ducharme and Katzir, correct?
A Yes.
Q So what was your standard for obviousness when you did this analysis?
MR. HOFFMAN: Objection to the extent it calls for a legal conclusion.
Q You can answer.
A Would you repeat it again, please?
MR. BRIGGS: Would you read it back, please?



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

(The question was read.)
MR. HOFFMAN: And mischaracterizes.
Q It says, I have been retained to opine on certain questions related to Ground I which asserts that Claims 1 through 3, 6 through 18, 21 through 24 and 27 to 31 would have been obvious.
Do you see that?
A Yes.
Q What is your standard for obviousness?
MR. HOFFMAN: Same objections. Calls for a legal conclusion, and it is a mischaracterization.
MR. BRIGGS: David, as you know, you can do objections to form but not the really long objections.
MR. HOFFMAN: If I say objection to form, will that cover a mischaracterization?
MR. BRIGGS: Yes. Can we go off the record for a minute?
(Recess was taken.)
Q Back on the record. So I was just asking you, Dr. Allen, what your standard for obviousness was as specified in paragraph 9 of your declaration?
A So I have already answered that question.
MR. HOFFMAN: Same objection. Form.
A I have already answered that.
Q Yes, and your answer was?



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A Can we pull it back up in the record? Do you recall that I answered?

Q I recall that you said that you used prior experience with obviousness.

Is that your answer again? I cannot testify for you. I am asking you what your answer is on what your standard of obviousness is, because it is not in your declaration.

So if you don't know what standard you used for obviousness --

A I am saying that I answered the question already. I don't know what your process is for this.

MR. BRIGGS: If you want us to go off the record and stop, she can go back and find it, because I am not going to delay my time here with him going back and getting his answer read all of the time.

MR. HOFFMAN: Okay. We will go off the record.

(Recess was taken.)

MR. BRIGGS: Back on the record. So thank you, court reporter, for finding his answer.

Can you please read his answer on obviousness back for the record so I can ask questions about it?

(The record was read as follows:



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

"Question. Okay. What is the standard for obviousness?

"Answer. The standard for obviousness, again, I don't have the legal language, but it is such that a POSITA would be able to put together in effect the invention based on what is taught in the patent.

Q Is that the standard that you applied in paragraph 9 of your declaration?

A Yes.

Q Okay. When you are assessing obviousness, do you look at the claims of the patent at issue?

A Yes.

Q And did you do so here?

A Yes.

Q Did you read the prior art?

A Yes.

Q Did you read each prior art reference in its entirety?

A Yes. No. One of those is 305 pages long. No, I did not read all 305 pages. I skimmed through much of that.

Q Okay.

A I know the content.

Q Okay. Let's look at Claim 1. If you can go to page 7 of your declaration. At the top there is a



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

paragraph 11.

Do you see that?

A Yes.

Q I am going to read it. It says, Claim 1 of the '582 patent recites an LED light system configured for providing broad-spectrum white light suitable for a commercial image recording, in a form factor of a fluorescent light lamp, correct?

A A fluorescent light tube lamp, yes.

Q Thank you.

That is the preamble of Claim 1, correct?

A Yes.

Q Then it says, the LED light system includes.

Do you see that?

A Yes.

Q Why did you replace the word includes instead of using the original language of comprising?

MR. HOFFMAN: Objection. Form.

A I don't have an answer for that.

Q Let's get Exhibit 1001 so we are working off the same thing. I am providing you a copy of 1001, which is a copy of the '582 patent.

You now have that, correct?

A I do, yes.

Q If you want to turn to Claim 1, it starts



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

with column 12, line 4, approximately.
Are you there?
A Yes.
Q So we just agreed that the first part of your paragraph 11 is the preamble, correct?
A Yes.
Q And then if we look at the '582 patent, line 7, it says, the LED light system comprising.
Do you see that?
A Yes.
Q But instead of saying comprising in your declaration, you say includes?
MR. HOFFMAN: Objection. Form.
Q Do you understand the question?
A It was not a question.
Q I said the light system -- in paragraph 11 you say the light system includes.
That is what your paragraph says, correct?
A Yes.
Q So you have replaced the word includes -- excuse me. You replaced the word comprising with includes in your declaration, correct?
MR. HOFFMAN: Objection. Form. Characterization.
A Correct, without quotes.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Q What do you mean correct, without quotes?
A Those words do not have quotes around them.
Q Right. I am asking, why did you replace the word comprising with includes?
MR. HOFFMAN: Objection. Asked and answered. Form.
MR. BRIGGS: He did not answer this question.
A Yes, I have. She can look it up again. Yes, I have.
Q You said why you replaced the word comprising with includes?
A You asked that question and I have answered it.
Q I have not asked it.
A You can look it up.
Q Why did you replace the word includes -- why did you use the word includes instead of comprising? I never asked that question.
MR. HOFFMAN: Objection. Form. Characterization. Harassing.
A You did ask that question and I answered it and I will repeat the answer now.
My answer to that question that you asked explicitly was, I don't have an answer for that. That



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

is in the record probably verbatim.
Q So you don't know why you replaced the word comprising with includes?
MR. HOFFMAN: Objection. Characterization. Form.
A It is not in quotes.
Q Okay. The claim says that the LED light system comprising, right?
A Yes.
Q Do you know what the word comprising means in the context of patent law?
A Not exactly, but I can give an interpretation.
Q Go ahead.
A It means that it includes the following; it may also include some other things.
Q Right. So it is open-ended, correct?
A Yes.
Q Do you know what the word consisting of then means in patent law?
MR. HOFFMAN: Objection. Legal conclusion. Not relevant.
A Consisting of, I am guessing because I don't know that aspect of patent law, but I would interpret that to mean that it is all inclusive,



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

consisting.
Q Closed as opposed to open, correct?
A I believe so.
Q Okay. So let's go down right below the language, the light system includes: and it starts 1B, correct?
A Yes.
Q Why is there no 1A?
A We were focusing on the claim elements that I have listed here.
Q So I just asked you though a few minutes ago when you did your obviousness analysis did you consider the claim as a whole. I don't see 1A here.
MR. HOFFMAN: Objection. Argumentative. Form.
Q Did you consider 1A in your analysis?
MR. HOFFMAN: Objection. Argumentative form.
Q Yes. Show me in your declaration where you considered 1A.
A This will take a while unless you would like me to use my digital copy and do a scan.
MR. BRIGGS: You can use your digital copy. Why don't we go off the record. You don't have to do this during the break. I just need to use the restroom



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

real quick. Let us go off the record.

(Recess was taken.)

Q So, Dr. Allen, thank you for letting me take a break.

If you want to use your electronic version to search for limitation 1A, that would be great.

A I can short circuit that. What I am looking for is my use of the word housing in regards to the thermal management and complete system. I don't recall without looking if I used that term. That is what I would be searching for, if that is sufficient to your question.

Q I will read what limitation 1A says. It says, A housing having ends and including a support structure in the form of an elongated and narrow surface having a top side and a bottom side. So it is just more than housing. It has to have the support structure and not really dimensions but at least a narrow surface and a top side and bottom side.

So I am a little confused. Are you going to search for that or you are not going to search for that?

A I don't believe that I have included those other aspects in my declaration, no.

Q Okay. That is fine.

All right. So going back to the word



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

includes, am I to understand that you have the same definition of includes that you apply for comprising? They are both open?

A Yes.

Q So if they are both open, that means, as you said, other things other than what are listed in the claim can be included, correct?

A Yes.

Q Okay. So, for instance, if we look at Limitation 1B and 1C on page 7, there is a plurality of first LEDs in limitation 1B and there is a plurality of second LEDs in limitation 1C, correct?

A Yes.

Q So conceivably a device that has a plurality of third LEDs would still be within the scope of Claim 1, correct?

A Agreed.

Q Okay. So in your analysis of Claim 1 did you consider the preamble to be limiting?

A Yes, it is somewhat limiting.

Q So I don't think somewhat counts. It is either limiting or not in patent law.

A I do not understand that aspect of the patent law. If you can explain it to me, please.

Q No. It is either limiting or not limiting.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

It is pregnant or not pregnant.

MR. HOFFMAN: Objection. Form. Argumentative.

MR. BRIGGS: I am not done asking my question. You can object when I am done asking my question.

MR. HOFFMAN: I thought you were done. I am sorry.

Q So it is either pregnant or not pregnant.

Is your answer that the preamble is limiting or not limiting?

MR. HOFFMAN: Objection. Form.

A As a non-attorney I know what pregnant and nonpregnant means. As a non-attorney, I don't know what limiting and nonlimiting means.

Q Okay. Let us continue on. So please go to page 9 of your declaration.

A Okay.

Q On page 9 there is paragraph 12, correct?

A Yes.

Q That says, Claims 6-7 both recite that the first and second LEDs are phosphor-based emitters, correct?

A Yes.

Q Do you know what the Doctrine of Claim



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Differentiation means?
A No.
Q So Claims 6 and 7 require first and second LEDs are phosphor-based light emitters, correct?
MR. HOFFMAN: Objection. Form.
A That is what my --
MR. HOFFMAN: Objection. Form.
A That is what my declaration says.
Q Which means Claim 1 does not require first and second LEDs or phosphor-based light emitters, correct?
MR. HOFFMAN: Objection. Form.
A Let me review Claim 1, please.
Q Sure.
A Correct.
Q Just to be clear on the record, Claim 1 does not require first and second LEDs are phosphor-based light emitters, right?
MR. HOFFMAN: Objection. Form. Legal conclusion.
Q I am trying to make sure the record is clear. All you said was correct. I want to make sure that we are saying correct to the right thing. I am not trying to do anything here.
Should I say the question again?



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A Yes, please.
Q So because Claims 6 and 7 require the first and second LEDs are phosphor-based light emitters, that means, and those same limitations are not recited in Claim 1, that means Claim 1 does not require first and second LEDs are phosphor-based light emitters, correct?
MR. HOFFMAN: Objection. Form. Legal conclusion. Scope.
Q You can answer.
A Correct.
Q Okay. So please look at paragraph 15 of your declaration.
A Okay.
Q Why don't you go ahead and read that and let me know when you are ready.
A Okay.
Q So the first sentence of paragraph 15 of your declaration, I have been asked to assume a date of invention of May 17, 2013, right?
A Yes.
Q Do you know why you were asked to assume that date?
A I do not.
Q Okay. Can you look at the front page of Exhibit 1001, please, which is the '582 patent.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A Okay.
Q If we look under related U.S. Application Data; do you see that?
A Yes.
Q There is in front of me I can see, because you are already going to page 2 which lists a bunch of applications, the earliest of which is filed May 17, 2013, correct?
A Yes.
Q Below that there is a provisional application number 61/648,554 filed May 17, 2012, correct?
A Yes.
Q Did you analyze the provisional application for your report?
MR. HOFFMAN: Objection. Form.
A I have and I read it. I don't know what you mean by analyze.
Q Review it. Look at it.
A Okay. Yes.
Q Okay. And did you come to a conclusion as to whether the provisional application provided support for the claim of the '582 patent?
MR. HOFFMAN: Objection. Form. Scope.
A I believe the provisional provides support



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

for the claims, yes.

Q So if the provisional provides support for the claims, why did you use a date of invention of May 17, 2013 instead of the provisional application filing date of May 17, 2012?

MR. HOFFMAN: Objection. Form. Scope. Asked and answered.

A It is exactly what my declaration says; I was asked to use that as the time of invention.

Q Okay. So after the first sentence there is a second sentence that talks about, I have further been asked to consider Petitioner's proposed definition for a person of ordinary skill in the art, POSITA, namely, that a POSITA would have had at least a Bachelor of Science degree in electrical engineering, or a closely related field.

Do you see that?

A Yes.

Q You do not have a Bachelor of Science degree in electrical engineering, do you?

A Yes.

Q You do?

A Yes.

Q It is not in your CV.

A It is.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Q Under what?
A The degree was in engineering science which includes as many courses in electrical engineering as an EE degree but it was an honors course so I had about five additional courses beyond an EE.
Q Or closely related field; that is good enough, correct?
A Yes, but specifically the answer to the EE is I have the equivalent of an EE even those it is named something else.
Q The next requirement is, along with at least two years of experience in the design of entertaining, entertainment, lighting systems.
Do you have two years of experience in designing entertainment lighting systems?
A Yes, in regards to the PAR lamps that have all the requirements of the entertainment lighting systems and, in fact, is used in entertainment lighting.
Q The design and use of LED lights?
A Yes.
Q Okay. So the next part of your paragraph 15 is patent owner's definition. It says, I have been asked whether my conclusion would change if a POSITA would have had two to four years' experience in



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

electrical engineering/design of film and television lighting systems.

Do you have two to four years' experience in design of film and television lighting systems?

A Yes, that is what I just answered, those PAR lamps are that experience in the design.

Q So just the lamps themselves but not the systems?

A Electrical engineering/design, that PAR lamp has a electrical circuit in it that I was responsible for as the overall system engineer.

Q Okay. So another requirement by patent owner is combined with two to three years of work experience as a set lighting technician in television and/or motion picture industry.

Do you have that experience?

A No.

Q Okay. Let us go to Section 1 of your declaration which starts on page 11. Here you have a header called Hasnain and Holmes failure to determine the lumen output of a lighting device as in Claim 1.

Wait a minute. I forgot to do this. Can you please go back to page 6 of your declaration?

A Okay.

Q So in paragraph 10 you have a listing of



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

documents received and reviewed for this IPR proceeding, correct?

A Yes.

Q And there is a list that looks like 8 letters long, A through H, correct?

A Year.

Q And A is the petition for the 5 -- excuse me. Scratch that.

Letter A is the petition for Inter Partes review of U.S. Patent No. 10,411,582, correct?

A Yes.

Q If I say the petition for the '582 patent, you know that I am referring to that document?

A Yes.

Q And then Exhibit 1001, which you already have a copy of, is the '582 patent, correct?

A Yes.

Q And then Exhibit 1003 is the Fred Holmes declaration, correct?

A Yes.

Q And when I say the Holmes declaration, you know that I am referring to Exhibit 1003?

A Yes.

Q And the next one is Kit, which is Exhibit 1004, U.S. Patent No. 7,507,001 right?



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A Yes.
Q So if I say Kit, you know that I am referring to that document?
A Yes.
Q The same thing, Exhibit 1005, Ducharme, if I say Ducharme, you know that I am referring to Exhibit 1001, correct?
A Yes.
Q The next one is Katzir. If I say Katzir, you will know that I am referring to Exhibit 1006, correct?
A Yes.
Q Next one, Iamiro, Exhibit 1007, if I say Iamiro, you know that I am referring to Exhibit 1007, correct?
A Yes.
Q Last but not least, Hasnain, Exhibit 1008, if I say Hasnain, you know that I am referring to Exhibit 1008, correct?
A Yes.
Q All right. Now that we have that laid out, if you can please go to page 19 of your declaration.
Why don't you read that and let me know when you are ready.
A That is paragraph 30?



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Q I am sorry. Page 12, paragraph 19. My bad.
A Okay.
Q So you say, Due to Petitioner's Declarant Holmes' and reference Hasnain's failure to consider lumen reducing penalties resulting form, without limitation the claimed luminaire elements, right?
I am going to go through the rest, but at least I got that first part right, correct?
A Yes.
Q Including, without limitation, the diffusion cover, the LED driver, the G/M 5 point limit and CRI of greater than 90, the Petitioner has failed to address the lumen output of the luminaire as a combined lighting system, right?
A Yes.
Q So there is five things there, the diffusion cover, the LED driver -- well, there is four things here.
A Yes.
Q G/M 5 point limit and the CRI greater than ninety.
So those are four requirements that are claimed, correct?
A Yes.
Q Okay. Those all have to be achieved at once



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

in your mind?
A Yes.
Q So if you can read paragraph 20.
A Okay.
Q So am I to understand paragraph 20 to say that Hasnain's 70 to 100 LPW per LED results are all inappropriate because they are for an uncovered LED tube light under ideal test bench conditions?
A I would not say inappropriate.
Q What would you say?
A I would say that they are incomplete.
Q So if you can look at paragraph 21, please, of your declaration.
A Okay. I have read it.
Q So it looks like we have the same four -- give me a second. I am sorry.
A Okay.
Q So in paragraph 21 you are saying all of the following elements recited in Claim 1 of the '582 patent have inherent lumen losses including at least, the diffusion cover, the less than 5-step MacAdam ellipses, the G/M 5 point limit. That is one and the same. Sorry. The CRI of greater than 90 and the circuitry.
So we have the same four limits or same four items from Claim 1 that you recited in paragraph 19; is



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

that right?

A Yes, but there is a fifth added here.

Q There is a fifth. What is the fifth?

A The last sentence, In addition, there is inherently a lower efficacy of the LEDs when operating at an elevated temperature. We refer to that later in the declaration as thermal droop.

Q Okay. So in paragraph 22, this is going after diffusion cover, I guess, it says, For example, there is a first substantial lumen loss due to optical loss from the diffuser covering the tube in order to blend the individual LEDs into suitable light output.

Did I read that right?

A Yes.

Q Okay. Do you want to explain to me what you mean by substantial lumen loss from a diffusion cover?

A Yes. I was developing a market leading LED light circuitry at the same time as this. I had the first energy certified LED lighted bulb in the world. It was highly acclaimed by GE.

At the time we were working with material and manufacturers like Behr in Germany to provide diffusion covers that had reduced absorption losses. We had to have a diffusion cover because the LEDs are tiny bright spots of light and they are annoying to the eye.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Even from an A line light bulb in commercial imaging recording application absolutely can see the bright dots behind it. It is very annoying.

So typically these diffusing plastics were 30 and 40 percent absorbing output. In 100 lumens, you get out 70 or 60. We pushed that technology to be 20 percent absorbing. That is the best that these guys could have done at this time.

So when we say we have 70 to 100 LPW from the LEDs, we are going to lose 20 percent of that just in going through the diffuser.

Q Does that matter whether the diffuser is clear, translucent or transparent?

A Yes, it matters. So clear you would not have those losses. You would have only surface losses, which are about 8 to 10 ten percent.

If it is translucent, it would not do the job. You would still see the bright points behind the translucent. It needs to be diffusing. We refer to it as a lambertian diffuser.

Q You do not consider a clear cover to be a diffused cover?

A A clear cover would not be suitable for commercial image recording application.

Q Okay. Can you please go to the Exhibit 1001



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

and look at column 6, line 31?
A Okay.
Q So the '582 patent allows for a clear diffuser shade tube, correct?
MR. HOFFMAN: Objection. Form. Legal conclusion.
Q Do you understand my question?
A Would you repeat it, please?
Q The '528 patent expressly says a clear or semi-translucent or translucent diffuser shade tube, correct?
MR. HOFFMAN: Objection. Form. Legal conclusion.
A Correct.
Q That is the same thing as a diffusion cover, correct?
MR. HOFFMAN: Objection. Form.
A This sentence, which you have taken out of context, continues to go on to say, is also visible which acts to diffuse the light.
Q I don't think I took it out of context. I read what it says.
A You did not read it all the way.
Q Sure.
A What I am saying is that we are teaching in



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

this patent spec that that diffuser shade needs to diffuse the light.

Q So if I just don't use the word semi-transparent or translucent, I say a clear diffuser shade tube is also visible which acts to diffuse the light, that is wrong?

MR. HOFFMAN: Objection. Form.

A I believe that the inventor may have had a broader use of the term clear. I can imagine it was that a clear cover could be diffusing.

Q Do you want to give me one?

A A diffraction grating.

Q So clear covers are possible?

A Not preferred but possible.

Q I understand.

If it is a clear cover -- excuse me. Going back to your paragraph 22, if it is a clear cover, there would not be as a substantial lumen loss, correct?

A If it was a clear cover that is by some mechanism diffusing the light, then it would have a loss to the cover.

Q I am looking at your words there, there is a first substantial lumen loss.

Would it still be a substantial lumen loss?

A Yes, nothing better than 20 percent at the



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

time of the invention.

Q Even for clear?

A I personally examined and understood every material available to the lighting industry at the time of the invention. Nothing better than 20 percent could provide diffusion.

Q Okay. Let's look at paragraph 23. Why don't you read that and let me know when you are ready.

A Okay.

Q So I am on page 15, in the middle of the page, and just tell me when you are ready.

A Yes.

Q It says, The LEDs would have to be driven at at much higher current than the rated current of the LEDs to achieve the things that you talked about previously. Is that right?

MR. HOFFMAN: Objection.

Q I can read the whole thing out loud, if you want.

MR. HOFFMAN: Form.

A I agree with what you said.

Q Why do they have to be driven at a much higher current rate?

A We are not getting the output that Hasnain taught we would get. So that 70 to 100 LPW would have



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

been the best available efficacy at that time. Best available efficacy means that you are not overdriving it.

In order to cover some of these losses, which we have only just begun to quantify in the declaration, there are huge losses to come. We have to drive the LEDs harder, harder than what Hasnain would have measured in his lab, and 70 to 100 LPW is going to drop considerably. The point is Hasnain and Holmes neither have considered those realities that a POSITA must take into consideration in designing this for commercial imaging recording.

Q When you say "drive it harder," do you mean apply more current?

A Yes.

Q Does applying more current increase the output of the LEDs?

A Yes, to an extent and then it saturates.

Q So I am going to give you a copy of Exhibit 2081 that you relied on.

A Thank you.

Q Can you tell me what Exhibit 2081 is?

A It is titled "Cree XLamp MK-R LEDs." It is a product family data sheet.

Q And I think that you assert that this is



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

from 2012?

A The copyright states 2012 at the bottom.

Q Did you locate this document yourself?

A Yes.

Q Okay. How did you locate it?

A I am familiar with all of these documents having worked first-hand with Cree and other manufacturers. I knew that it existed. I went and found it.

Q Okay. So I will ask some questions about it in a minute. If you can just turn to page 2.

A Yes.

Q It says, Flux characteristics, standard orders cords and bins.

Do you see that?

A Yes.

Q It has a bunch -- it has a table below that.

Can you explain this table to me?

A So this table has several headings. On the left one-third of the table we are identifying the LED. On the middle far-right thirds of the table we are identifying order codes. The 20-digit long number thing is how you would order the LED. We are also identifying the chromaticity region which is referred to as the chromaticity color binning diagram.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

In the left one-third we also have output or flux, so-called binning. And so the group, which is called H2 or G4, for example, are higher lumens or lower lumens. And so a buyer of these LEDs has to come in and specify exactly per the order code number which output bin, intensity bin and color bin they want to purchase.

Q Okay. Can you tell me what the difference is between a two-step order code and a four-step order code?

A Yes. These steps refer to MacAdam ellipses which is in the chromaticity diagram. We call that CCx, CCy or CCe chromaticity space. We have a target color point that we want and then these LEDs are specified to be within some elliptical range around that target color point. A two-step ellipse would be roughly half the size of a four-step ellipse.

Q When you buy these LEDs from Cree, are the power supply requirements already built into the standards?

MR. HOFFMAN: Objection. Form.

A That question is vague to me. If you can clarify what you are asking.

Q I see in the note it says, Cree maintains a tolerance of plus-minus 7 percent on flux and power measurements.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A Okay.
Q So what do they mean by that?
A Well, the plus-minus 7 percent on the flux would refer to what we see as columns four and five, flux at 85 C, flux at 25 C. And so what they are saying is we specified the top row 1,044 lumens and we are saying that you can expect it to be within plus-minus 7 percent of that.
Power measurements may be referring to some other aspect. For example, I am searching here, I don't see power in the above table. There may be power in watts cited somewhere else in this document that they are referring to as a percentage on power.
Q Okay. If you can read paragraph 24 of your declaration and let me know when you are ready.
A Okay.
Q So this section is titled "Losses from G/M 5 Point Limit," correct?
A Yes.
Q Can you tell me what that means?
A Well, the G and the M are referring to green and magenta and that refers to -- without a diagram, I am just going to be hand waving. But there is a black body curve which we refer to as white light that can have different color temperatures, blue or



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

red, magenta. But that black body curve is the target color point for these specifications. If we go above that black body curve, it means we have an excess of green in the otherwise white light. If we go below the black body, it means we have and excess of magenta or red relative to a pure white.

Q Okay. This was well-known before the '582 patent, correct?

A Sure. Yes.

Q Was it possible to order LEDs with less than a 5 G/M in 2013?

A Yes.

Q Okay. Would those LEDs also have a CRI of not greater than 90?

A That would be very difficult to find the combination.

Q Okay. If you --

MR. HOFFMAN: I -- go ahead. I am sorry.

Q So if you can look at paragraph 26 of your declaration, please. Just review it and let me know when you are ready.

A Okay.

Q So this part I am not following. There is a table on the right-hand side of your paragraph 26, correct?



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A Yes.
Q And it refers to Exhibit 2081, and I have gone through 2081 and I cannot find this table.
Can you help me find this table in paragraph 26?
A This is confusing to me because I just reviewed my declaration and looked at that table from which I derived this simplified table, and I don't see that table now in this paper copy.
Q Exhibit 2081 is also in front of you.
A Oh, it is in the exhibit. That is where I found it. Sorry for the confusion.
Q The reason that I am confused is because your declaration says page 2 inserted from table at page 2, which I think that is a typo.
A Yes, I agree. I wonder if we even cited the wrong Cree document here.
Q That is fine.
Do you want to say that you believe this table is correct based on your knowledge?
A Yes. And I can, if you would like, I can find the proper document on my laptop.
Q Sure.
A From within the document that was provided.
Q Not right now. On a break. Right now I am



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

fine with you --
A I am sorry.
Q -- that you understand this table to be accurate based on your knowledge?
A Yes.
Q Okay. And so my understanding of this table is that you have got various filters being applied; is that correct?
A Yes.
Q Those result in lumen penalties?
A Yes.
Q If an LED is capable of getting less than 5 G/M, you do not need a filter, correct?
MR. HOFFMAN: Objection. Form.
A You may still need a filter if it is less than 5G, but if it is 4.9G and you don't want to be marginal, you would use a filter.
Q I understand. Okay. Moving on, so here is where I think we need to get on the same page about a numbering issue.
If you can go to page 18 of your declaration. I am going to walk through the paragraph numbers. So paragraph 18 at the bottom starts -- I mean, on page 18, the last paragraph is 29, correct?
A Yes.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Q The next page, page 30, the next page there is a table and then we are at 28 again, right?
A Yes.
Q Is it okay with you if I refer to the paragraphs on page 21 as 28A, 29A and 30A so the record is clear?
A Yes. I am sorry for that.
Q That is no problem. It happens in Word all of the time.
Referring you to normal 29 on page 18.
A Yes.
Q Can you look at that and let me know when you are ready?
A Okay.
Q So here you say, Losses from CRI greater than 90 is the header for this paragraph, correct?
A Yes.
Q I think that you have already answered this, but did LEDs exist that had a CRI greater than 90 in 2012?
A Yes, but they were not typical.
Q Okay. So paragraph 30 on page 19, please. I only have a question about the sentence in middle. It says, In the time frame of 2009 to 2013, before the advent of narrow-band LED phosphors, right?



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A Yes.
Q What is a narrow-band LED phosphor?
A Well, in fact, it is a breakthrough technology that we developed at GE Lighting that I was part of and without certain graphics it is difficult to describe. The graphics can be found in the documents.
But before narrow red phosphors, we achieved high CRI by having broad red phosphors; meaning that the extent of the phosphor along the visible spectrum was almost 100 nanometers wide. The visible spectrum is only 300. Just providing it in red required a very broad-band phosphor and most of that light spilled out beyond 700 nanometers in the infrared. So it is wasted. It is an efficacy loss.
So the only way, when we came up with the narrow red phosphor, we had the wavelength exactly where we needed it, less than 700 nanometers, nothing spilling into the infrared. So what we had before, we had narrow-band red phosphors. If you wanted to achieve 90 LPW, that broad-band had to be so far into the infrared that it would cost you typically 24 percent in your lumens relative to an 80 CRI. I would have used narrower but not narrowless broad phosphor.
Q Okay. So if I am understanding you correctly, a phosphor is a narrow-band phosphor if its



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

emission wavelengths are narrower than what was done before?

A No. That is part of it, yes.

Q Okay.

A The broad-band red phosphors were extremely broad, as I mentioned, on the order of 100 nanometers and there is no reason for that other than that is all the technology can do. In order to provide red, we need to fill only maybe a 30 to 50 nanometer wide band. The narrow red phosphor would be 50 or less nanometers.

Q Now I get it. So it is around 50 nanometers?

A We were narrower than that, but that is where I would put the continuum --

Q And those did not exist in 2013?

A No.

Q Okay. If you can then please look at page 21 and what I am going to call paragraph 30A.

A I am sorry.

Q Are you ready?

A Yes.

Q It says, But Hasnain does not specify the CRI of the 70 to 100 LPW LEDs, right?

A Yes.

Q Doesn't a POSITA want to achieve a high CRI



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

for commercial image recording?
A Yes.
Q So if Hasnain knew that his device is going to be used for commercial image recording, he would specify a high CRI, correct?
A No.
Q Why not?
A He does not say that he did.
Q Okay. At the time of Hasnain -- actually, in the time of 2012 a POSITA looking at Hasnain's disclosure, would a POSITA be able to purchase the LEDs, for instance, from Cree and make those in Hasnain's device?
MR. HOFFMAN: Objection. Form.
Q Sorry. I probably butchered that.
A If you can just repeat, please.
Q Sure. So in 2012, the time of the Cree data sheet --
A Yes.
Q -- if a person looking at Hasnain, a POSITA wanted to purchase LEDs for his devices, that person could purchase the Cree LEDs, correct?
A Yes.
Q All right. Are you good for a while?
A Yes.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Q Let us go another 15 or 20 minutes. So let's go now to thermal. So if you could go to page 23 and Section II is in the middle of the page.

It says, Due to thermal issues, a POSITA would not have a reasonable expectation of success in trying to create the device of Claim 1.

Do you see that?

A Yes.

Q Okay. So let's stay in that section and if you can look at paragraph 38.

A Okay.

Q It looks like you relied on a declaration of Mr. Csernecky.

Do you see that?

A Yes.

Q I am not quite sure I get from your paragraph why you did that.

Can you explain why you relied on his declaration?

A Yes. His declaration explained the relatively high thermal challenge of commercial image recording applications where linear tubes may be stacked vertically in a ladder formation. And what that does is each tube is creating heat. Heat rises and so the very top-most tubes are going to be much,



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

much hotter than the ambient air temperature.

The point being that a product like this where the reliability and quality is so demanding, we have to design for the worse case.

Q Okay. Do you recall a statement by Mr. Csernecky in his declaration that bicolor lights were around at the time of the '528 patent?

MR. HOFFMAN: Objection. Characterization.

A I don't recall that. I was not looking for that.

Q Let us look at it.

A If it is okay, I would like to take something for this throat, cough I have going on here.

Q It sounds like we have the same thing.

A It is annoying, and I apologize for it.

Q I got mine last Saturday.

If you would not mind grabbing your copy of Mr. Csernecky's declaration there, Exhibit 2041. And then going to page -- I don't have the page. Go to paragraph 12. Just read that and let me know when you are ready.

A Okay.

Q So the last sentence of Mr. Csernecky's declaration says, It was not bicolor, even though bicolor had existed for years in a light panel, correct?



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A In a panel light, yes.
Q Yes. I apologize.
Do you agree with that?
A The term panel light, if he has not defined it elsewhere, can be somewhat vague. Do I agree with it? I don't know. I rely on Mr. Csernecky's declaration for expertise in that regard.
Q Do you agree that an LED lighting system had bicolor for years before the '582 patent, some type of lighting system, whether it is panel light or otherwise?
A Bicolor for some type of lighting system prior to the time of the invention, yes.
Q Okay. That is it.
Are you aware of a company named Light Panel?
A No.
Q Okay.
A No.
Q No?
A I am conflating it with a different one.
Q So if you can look at paragraph 42 of your declaration and let me know when you are ready.
A Okay.
Q So your heading for paragraph 42 is Holmes omits substantial thermal management design



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

1 considerations, correct?
2 A Correct.
3 Q When you are doing your analysis in
4 paragraph 42 and elsewhere in this section, are you
5 having a requirement that a device is fully enclosed?
6 MR. HOFFMAN: Objection. Form.
7 A In order to meet the limitations of Claim 1
8 in the '582 it has both a housing at the back and a
9 cover at the front or the bottom and the top.
10 Q Okay. Why don't we look at Claim 1 then.
11 Let us walk through it. Please go to Claim 1 of the
12 '582 patent.
13 A Okay.
14 Q Let us look at Limitation 1A. It says, A
15 housing having ends and including a support structure,
16 correct?
17 A Yes.
18 Q There is nothing else about the housing
19 there, correct?
20 A Yes. Correct.
21 Q And then if we go down to Limitation 1E, it
22 says, An elongated cover extending substantially a
23 length of the support structure and covering the top
24 side of the support structure, correct?
25 A Correct.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Q So now we have got a cover that covers the support structure and we have a housing with ends?
A Yes.
Q There is no back recited anywhere in Claim 1?
MR. HOFFMAN: Objection. Form.
A Go to Limitation F. So we have the housing and the cover together have a linear form factor of a fluorescent light tube lab. That is the circular tube, circumference all around. Having a diameter, which infers a circle, a cylindrical tube having a top and bottom and enclosed all around of no greater than approximately 41 millimeters.
Q So you are reading, which is fine, you are reading a linear form factor to require a backing?
A No. It is a linear form factor of a florescent tube.
Q Okay.
A And the fluorescent tubes are cylinders.
Q It says linear?
A Linear means it is straight.
Q Right. Form factor?
A The form factor generally means a right circular cylinder is what I interpret that to mean.
Q Okay. That is what I am asking. So as part



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

of your analysis Limitation 1F informed you that you should have an enclosed lighting system?

A Yes.

Q Okay. If you can go to paragraph 43. Why don't you go ahead and read that, and especially the part about Exhibit 2083, and let me know when you are ready.

A Which Exhibit is 2083?

Q I am about to give it to you. I did not want to bother you yet.

A Okay.

Q I figured if I give you enough exhibits, you will just tell me what I want to hear.

A Okay.

Q Okay. So I am going to hand you Exhibit 2083 now. Why don't you go ahead and turn to page 13, which is what you cited.

A Did I cite that here?

Q Yes.

A In paragraph 42?

Q 43. Yes, it is about seven lines up from the top.

A I got it. Thank you. Which page? 13 did you say?

Q That's right.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A Okay.
Q Are you ready?
A Yes.
Q So you pointed out this table on page 13. I don't know if I should call it a table or box. It is a light blue color.
A Yes.
Q Below that it has got some additional language that is not related to the table. It says, a maximum ambient temperature.
Do you see that?
A Yes.
Q So it says, A maximum ambient temperature of 62 C for the example luminaire is acceptable for this indoor application.
For an operating environment needing higher maximum ambient temperature, either the maximum junction temperature should be raised, which may impact lifetime, or the thermal system R improved, e.g., better heat sink.
Do you see that?
A Yes.
Q Were these well-known tradeoffs in 2012?
A Yes.
Q So if you wanted the higher maximum ambient



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

temperature, then that may impact the lifetime of the device?

A If the LED operates at a higher temperature than its specification, it would impact the life of the device.

Q Okay. Fair point.

So was it possible to specify higher maximum junction temperatures --

MR. HOFFMAN: Objection. Form.

Q -- in 2012?

MR. HOFFMAN: Objection. Form.

A I will answer generally not.

Q But even though they say either the maximum junction temperature should be raised, that is not an indication that Cree has an ability to raise maximum junction temperatures?

A They do.

Q Okay.

A And the point, the reason that I cited Cree references is that Cree LEDs had the highest available maximum temperatures available.

So if a POSITA wants to design the system thermally, he is not going to do any better than what Cree tells us.

Q Understood. It also says, or the thermal



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

system improved, e.g, a better heat sink.

So was it known to add heat sinks to LED lighting systems in 2012?

A Yes.

Q Okay. Continuing on. So if it was known to consider heat sinks in the thermal analysis in 2012, did you do so in analyzing the combination of the prior art?

MR. HOFFMAN: Objection. Form.

A The prior art provided no heat sinks.

Q So let's go to paragraph 44. Why don't you read that, mostly in the middle of the page where it says the copyright date.

Do you see that on page 31?

A Yes.

Q It says, Furthermore, the copyright of the Cree document is 2007 to 2016, from which it is clear that the data is from 2016, right?

A Yes.

Q Therefore, the LEDs in 2010 to 2013 would have higher thermal limits.

I don't follow how something from 2016 can be used to opine on 2010 to 2013?

MR. HOFFMAN: Objection. Form. Characterization.

A I think that you may have misread it. It



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

says, In 2010 to 2013 at the time of the invention would have thermal limits no higher than those quoted in the Cree Luminaire Design Guide.

Q Explain it to me. I do not understand why we are using a 2016 document that go after things that happened three years prior.

A It is in your favor. I am showing how far LEDs thermal capabilities have developed by 2016, and the answer was that we want the junction temperature no higher than 80 degrees C. In 2010 to 2013 the allowable junction temperature would have been no higher than that, probably significantly lower than that, which makes the Hasnain and other attempts at providing thermal solutions even more insufficient.

Q Okay. You raise a point that I wanted to ask about. At the bottom of the page 31 it says, p-n junction 80 degrees C limit.

That is what it says, correct?

A Yes.

Q If we go back to 2081 though, Exhibit 2081, I am sorry, and we go to your table that you cited, if I look at the -- actually, above that, it says, in characteristics, it is talking about LED junction temperatures as high as 150 degrees.

Do you see that?



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A Yes, as a maximum.
Q As a maximum, okay.
A That means it will not burn up in less than a minute on your benchtop. It is not an operating spec. I am being facetious on that one minute by the way. I mean, it is not a design spec.
Q Since you are under oath, let us try to keep the facetiousness to a minimum.
A I am sorry.
Q That is okay. If you can go down to table 2 or the table right below it. It says, Flux LM at 85 C, right?
A Yes.
Q Aren't those specs for 85 C?
A It is telling you what your performance will be when you run hotter than the spec. When you run hotter than the spec, you are going get shorter life, worse color on every performance specification related to LED and there are charts in here to show that degradation. Every performance attributes degrade above the spec temperature.
So what they are telling you is if you operate higher than the spec temperature, and only by 5 degrees C by the way, this is how your lumen output will suffer.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Q How do you know that the spec temperature is 80 degrees C? To me it looks like 85 degree C spec temperature.

A I go back to the Luminaire Design Guide.

Q That is four years afterwards though, correct?

A Again, in your favor. So anything -- if Cree had a design guide in 2010 to 2013, 80 degree C spec would have been the most that they could offer; probably significantly less than that.

Q I am confused. Why do they have 85 C in this Exhibit 2081 in this table then?

MR. HOFFMAN: Objection. Asked and answered.

A I don't mind answering it again. I understand that you are confused, so I will go further.

The specification -- let us see what the date is on this, 2012. I am not see seeing a specification. In other words, under typical for LED junction temperature there is no spec there, right? So we don't have a specification in this data sheet for junction temperature.

Q Okay.

A The best guidance that I can get on junction temperature is from Cree's Design Guide from



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

2016.

Q So in other words, if you would not mind my interrupting for a second, this characteristics chart that is it at the top of page 2, if this chart would fast forward three years or four years to 2016, it would have a value of 80 degree C at the LED junction temperature?

A I would expect that. I don't know that.

Q Okay. Now I understand what you are saying.

A Okay.

Q So just staying in paragraph 44 of your declaration, Exhibit 2080, on page 31, right above that, above the G/M junction limit you say, And on film or TV set conditions such as wrapping a luminaire in black wrap or gel.

Do you see that?

A Yes.

Q So can you please look at Claim 2 of the '582 patent?

A Claim 2?

Q Yes. Just read it out loud.

A The LED light system of Claim 1 wherein the LED light system is provided without a gel or filter.

Q So Claim 1 of the '582 does not require a gel or filter?



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A It does not require it. It could be there.
Q So then if we go to page 33 of your Exhibit 2080, on paragraph 48 there is a heading called, Junction temperature versus solder point temperature deduction, right?
A Yes.
Q And you are saying Hasnain and Holmes failed to consider this, correct?
A Yes.
Q And then if we go to the next page, page 34, the heading of paragraph 49 is Holmes use of Hasnain fails to account for a diffusion cover, correct?
A Yes.
Q So your opinion is that Holmes' calculations or opinions did not account for a diffusion cover when he examined the prior art, correct?
MR. HOFFMAN: Objection. Characterization. Form.
Q Sorry. Do you want me to replace --
A I will mention that Holmes make no mention of a diffusion cover or the thermal penalty made by that.
Q Okay. If you go to page 38, paragraph 53 of your declaration, you say, Hasnain and Holmes failed to account for nearby equipment heat and studio set



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

ambient, and location conditions, right?
A Correct.
Q And this is another defective analysis of Holmes, correct, in your opinion?
A It is an incomplete analysis, yes.
Q Incomplete, okay.
And then page 39, paragraph 54, the heading is, Thermal effect of increased operation power to overcome lumen penalties, correct?
A Yes.
Q You say, Furthermore, Hasnain and Holmes omit another key factor. This is the increased operation power?
A Yes.
Q And then if you can go to page 42, paragraph 59, your Conclusion.
I am assuming there is nothing that you want to change in your Conclusion today?
A Correct.
Q Why don't we take a break.
How much time do you guys need?
A Whatever you prefer. This is not the lunch break, right?
MR. HOFFMAN: That's correct.
MR. BRIGGS: We will do lunch in about an



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

hour. Let us do five-ish minutes.

(Recess was taken.)

Q Back on the record.

Dr. Allen, if you can please grab your copy of the '582 patent. If you can please go to column 10 and read example one and let me know when you are finished.

A Okay.

Q So the first sentence says, A four foot long T12 1.5 diameter LED lamp was constructed with four rows of alternating LEDs of a daylight time and tungsten (warm light) type using the pattern of Figure 1A, correct?

A Yes.

Q Do you want to look at 1A to familiarize yourself with that?

A Just briefly. I recall it. Okay.

Q And then below that there is a table.

Do you see the table?

A Yes.

Q And can you just go through the table and let me know if you have any issues with any of the units of the table?

A Yes, I do.

Q Would you please explain those to me?



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A Luminosity is listed in the sixth row for daylight and then tungsten is below that. These are lux for foot-candle levels and that is what may normally be used in application but, as cited in the claims, we need to have lumen units for the luminosity, which the later tables do provide.

Q And is it possible, is there like a conversion factor that you can use to get exactly foot-candles to lumens or is that not possible?

A It is with some -- I am sorry. Were you going to say something?

MR. HOFFMAN: No.

A It is possible with some bold assumptions.

Q So then below that it says, Spacing of LEDs may, e.g., be one quarter inch apart or about one inch, one quarter inch apart from the middle of one LED to the middle of the next one, correct?

A Yes.

Q Anything special about that spacing?

A Well, that spacing is determining how many LEDs can fit in a 44-inch or 48-inch long tube.

Q We see below he gets a total of 576, correct?

A Yes.

Q Each of the LEDs is roughly about an eighth



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

of an inch square, correct?
A Yes, he is quoting there 3.5 by 2.8 millimeters. So about an eighth of an inch or something less than that.
Q I see. Are those typical LED sizes for that time?
A It is one of the typical sizes, yes.
Q There is no mention of a cover anywhere in example one, is there?
A Well, he is telling us that it is an LED lamp as opposed to a strip of -- as opposed to what Hasnain has.
I would interpret that, when he says LED lamp, to mean that he has the LED replacement for a florescent tube. I think that is what a POSITA would interpret that as.
Q So you think this testing was done with a cover on it?
A My interpretation, and I think the interpretation of a POSITA is that the inventor had what we would consider to be an LED lamp which would include a cover, yes.
Q If you can then read example two.
A Okay.
Q So we have another four foot long T12 one



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

and a half inch diameter LED lamp, correct?
A Yes.
Q Again looking at the table, the table in example two, are there any units that seem out of place?
A Well, there is a unit missing but easily assumed that is on the luminosity where we have 1107 and 1010, those are clearly, in the interpretation of a POSITA and myself, those are clearly lumen values.
Q Anything else?
A If you want to get really detailed, there is an inconsistency in the temperature ranges, row one says two and row two has a dash.
Q I am sorry. Just strictly on the right units used for scientific purposes in the table, not typos or anything like that.
A I see. I believe so.
Q And then right below that table it says, At one foot the output can be over 1,000 lumens.
Is that a correct statement in terms of how you are able to measure luminosity?
A No, that is not a correct statement.
Q Okay. Is there a way that we can interpret that statement then?
A Yes, I interpret it to mean that in the way that lumens are normally measured, the output can be



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

over 1,000 lumens per foot is what he is saying. I am sorry. I may have misstated.

He is saying at one foot, which I interpret to mean at one foot away from the LED lamp, he is saying the output can be over 1,000 lumens. And to answer your question, that is a technically incorrect statement.

Q Okay. Let us look at example three then, please.

A Okay.

Q We have another four foot long T12 LED lamp and then we have a table below it.

Can you please examine the table and let me know if there are any scientific units that are incorrect?

A No, I believe he has gotten them all correct.

Q Below that it says, life span and examples one, two and three estimated at 40,000 hours?

A Yes.

Q Is that long?

MR. HOFFMAN: Objection. Form.

Q What do you think of 40,000 hours lifetime?

A It tells me that the thermal design is very good.

Q Let's look at the next sentence.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A Okay.

Q To create the LED lamps in each of the above examples, LEDs and desired color ranges are selected which provide at least 1,000 lumens.

So instead of the lamps themselves providing the luminosity, it is the LEDs, correct?

A Yes, this is improperly stated. A POSITA will understand what the inventor is saying here is that I am taking LEDs and measuring them for their lumen output, understanding that I am going to put a certain number of LEDs into the luminaire and, when I add them all up, for example, 576 LEDs, I will exceed 1,000 lumens. That is not how it is said, but that is how I and a POSITA would interpret it, I think.

Q Right. But we have at least 1,000 lumens based on the LEDs alone, no cover, right?

MR. HOFFMAN: Objection. Vague. Characterization.

A I would not interpret it that way at all. The inventor knows and has explained in all of the elements in Claim 1 all of the limitations that go into this lamp and for which he has to choose the individual LEDs in order to get 1,000 lumens out of the limitations, as stated in the claim.

Q You understand the claims are based on



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

written description supported in the specification, right, not the other way around?

MR. HOFFMAN: Objection. Argumentative. Form.

Q I will ask it a different way.

You understand that the specification has to provide a written description in support of the claims of the patent, right?

A Yes.

Q Which means that the claims are interpreted in light of the specification, correct?

MR. HOFFMAN: Objection. Legal conclusion. Form.

A That is a legal guideline that I don't know verbatim, but I would assume that that sounds correct.

Q Okay. Your statement earlier was, well, he has these values in the claims so he must have meant those values with a cover on it. That is a backwards analysis.

A No, I don't believe that is what I said.

Q Okay.

A I am not taking 1,000 lumens from the claims and saying okay, I understand why he put 1,000 lumens in here, no.

He is saying that my target is 1,000 lumens



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

and I am going to select my LEDs and measure every one of them so that in the aggregate and with the limitations of my invention I will achieve 1,000 lumens. That is my target. Having achieved that target in the spec, now he can claim it.

Q Okay. So I believe a few minutes ago you were discussing the 40,000 hour life span that is recited in lines 11, column 11, line 37 and 38.

Do you see that?

A Yes.

Q And you mentioned something about heat. I am not trying to get another answer. I am trying to remember what you said. I can go back.

A I understand.

Q That is fine.

A My remark was that that tells me that the thermal management design is very good.

Q Okay. Can you point to me in the '582 patent where you see good thermal management design?

A There is possibly, as I recall, one instance that is in the claims where we have a limitation of an aluminum housing and an aluminum housing would enable, I should not use the word enable, would be required for very good thermal management.

Q So Mr. Macias overcame all of these thermal



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

penalties by using an aluminum housing?

MR. HOFFMAN: Objection. Form.

A Well, he does not tell us the dimensions, shape, functionality of that heat sink. He does tell us that it is an aluminum housing, and I, as an expert who have done this, a POSITA who understands, the POSITA would know that that aluminum housing enables me to dissipate heat by means of lots of different techniques which Mr. Macias does not specify.

Q So aside from an aluminum housing, is there anything else in the '582 patent that teaches a POSITA how to overcome all the thermal management issues described in your declaration?

MR. HOFFMAN: Objection. Form. Scope.

A Should I answer?

Q You should.

A Most significantly the results of especially example two in my opinion and the statement of 40,000 hour life and the guidance of an aluminum housing give a POSITA high confidence that without undue experimentation these results can be reproduced.

Q There is no designs described in example two, correct?

MR. HOFFMAN: Objection.

Q Thermal dissipation designs, correct?



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

MR. HOFFMAN: Objection.

A I provided two guidelines. The question is already answered regarding thermals. The one is the indication of 40,000-hour life by which the inventor is telling me that I have solved the thermal problems. Mr. POSITA, the thermal problems are solvable. I solved them. He is in possession of that solution.

Secondly, the claims indicate to us that part of that solution was an aluminum housing.

Q So sitting here today, other than the 40,000 hours and the aluminum housing, there is nothing that you can point to that talks about how heat dissipation results?

MR. HOFFMAN: Objection. Characterization. Vague. Scope.

A I am confident that a POSITA would understand that since this inventor has achieved it and has told us that the method that he used to achieve it was selecting high performance LEDs, providing an aluminum housing and solving the thermal issues, as a POSITA I would have high confidence that I could reproduce that result. I don't need all the detail guidance.

Q Can you go to paragraph 22 of your declaration, please?



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A Okay.
Q So in paragraph 22 you talk about a diffusion cover?
A Yes.
Q Does Mr. Macias explain how he overcame the issues with the diffusion cover and thermal housing in the '582 patent?
MR. HOFFMAN: Objection. Scope.
A I believe I answered this from all perspectives.
Q Is the answer the same, the 40,000 hours and the aluminum housing?
MR. HOFFMAN: Objection. Characterization.
A Yes.
MR. HOFFMAN: Scope.
A I am sorry. I should wait.
Q Can I assume that answer is going to apply for current loss or current droop?
MR. HOFFMAN: Objection. Vague. Form.
A No, current droop is a separate topic, one aspect of overheating that must be resolved through the thermal management. Remember there were at least five other contributions to overheating that we have discussed and more coming.
Q In paragraph 24 of your declaration, The



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

losses from G/M 5 point limit, does Mr. Macias in the '582 patent explain how he overcame those issues?

MR. HOFFMAN: Objection. Scope.

A So it is the same answer, and I will repeat it. He overcame the challenges of providing less than 5 G/M by testing probably a high number of LEDs, selecting those which meet his criteria, 576 of them, and those are the ones that went into the luminaire.

Q Okay. Let's go to -- did I give you a copy of Hasnain yet?

A No, I don't believe so.

Q So if we look at Hasnain, which is Exhibit 1008, you studied Hasnain for your report, correct?

A Correct.

Q And why don't you go ahead and read column 4, lines 23 to 41 and let me know when you are finished.

A Okay.

Q So it looks like Hasnain got a bunch of LEDs mounted on a heat dissipating structure 36, correct?

A Yes.

Q And that is shown in Figure 2, for instance, which is on sheet 2 of Hasnain, if you want to go check that out.

A Yes, I see it.

Q And then in that section of Hasnain that you



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

just read, it says, at line 37, It has been determined experimentally that if LEDs are spaced apart, and it goes on, okay?

A I am sorry. I am not following you. I am in the wrong column. Yes, I am good.

Q That is okay. Column 4, line 37, It has been determined experimentally that if the LEDs are spaced apart, and it goes on, right?

A Yes. Yes.

Q Is that language the reason that you use benchtop experiment in your declaration?

A I am referring to what I see in the figure. I would label that, in my experience, the way that I do inventions and development as a first step benchtop experiment where I have part of the system and I am starting to characterize it and it is an insignificant part of the system.

Q Okay. Why don't you read the next paragraph which starts at column 41 and let me know when you are finished.

MR. HOFFMAN: Did you mean line 41?

Q Did I say column 41? There is no column 41 in this patent. Column 4, line 41. Sorry.

A Okay.

Q So here Hasnain teaches that if additional



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

heat dissipation is required, you can use an additional heat dissipating surface, 47, correct?

A Yes.

Q Did you consider that aspect in your analysis?

A Yes, certainly.

Q Can you point me to that, please?

A In my declaration?

Q In your declaration.

A I am not sure that I will find it in my declaration. That is not the question that you asked. You asked if I considered it.

Q I am asking if you considered that specific disclosure.

A Yes. I do need to find it in my declaration.

Q Why don't you look at page 34, for instance.

A Okay.

Q On page 34 I see that you have Figure 3 here but you stop at line 32 and then I went through the rest and I can never see you discussing this additional aspect.

A Where do you mean that I stop at line 32?

Q In the middle of 34 you say, The entire assembly of 30 and 34 emerge. You have cited Exhibit



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

1008, column 4, lines 23 to 42.

A I see what you mean. Okay. That is a good point. Let me review that.

I am simply asserting in my declaration at that point that Hasnain does not have a cover. I am not further going down into Hasnain to discuss heat sink.

Q Okay. But would you agree that Hasnain says, If additional heat dissipation is required, an additional heat dissipating surface can be used?

A It could be. He did not do it. He did not do it correctly. He did it insufficiently, far insufficiently.

Q Okay. I am asking if you considered this additional heat dissipating surface in your analysis of the prior art?

A Yes.

Q Where?

A That is why I asked you, does it have to be, do I have to have numerical calculations in my declaration? No. I have an explanation in my declaration of why it is insufficient.

Q If you just want to point me to where you say this additional heat dissipation required an additional heat dissipation surface is inadequate, I am happy to look at it?



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A Okay.
Q I will give you, if you go to page 47 of your declaration, you talk about Figure 4.
Is this something Hasnain discloses as a whole which you are required to do in term of obviousness? I don't see this.
A Repeat that.
Q I think earlier we talked about the rules on obviousness and one of them is every reference must be considered as a whole.
So I am just asking if you considered this additional teaching of Hasnain when you were considering your analysis of the thermal impact of the combined prior art?
MR. HOFFMAN: Objection. Form. Asked and answered.
A Yes, I did.
Q And you were about to go find it for me, correct?
A Yes.
Q Okay. I will wait.
A The first aspect of this inadequacy of Hasnain's benchtop experiment is that he does not have the cover. So what he has in 36 is what we consider to be a spreader. It is the printed circuit board in



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

which the LEDs are mounted. Part of its function is to take the heat from right below each LED and spread it laterally.

Then he adds, what is it, 47, referring to, in thermal contact with 36. What he is doing is adding a bigger spreader, okay. It looks thicker. It looks wider. And so he is getting more surface area which he claims is wonderful. It is not. He is transferring heat from the LEDs to a spreader, to a bigger spreader and it is still on a benchtop. That hot air that comes out from the spreader is allowed to freely circulate into the air of his laboratory.

In a tube LED lamp, both of those spreaders will be enclosed in the cover and housing. So we are just making the air inside the tube hotter with the spreaders. We are not getting the heat out of the tube.

So it does not matter how much spreading; spreading is not heat dissipation. It is thermal smoothing. He is doing a smoothing operation.

Holmes should know what Hasnain is doing and should know that that is not what is stated in Claim 1. Hasnain is not solving the problems of Claim 1. Hasnain is doing no thermal management other than spreading.

There is another aspect of Hasnain that we can discuss later. He is not solving the thermal



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

management problem with a cover.

Q Are you done?

A I am sorry. I went too long.

Q No, you never go too long. You can answer as long as you want. I do not want to interrupt you.

So is your interpretation of Claim 1 that the housing cannot have a thermal management system on the back of it?

MR. HOFFMAN: Objection. Characterization. Form.

A Claim 1 does not tell us anything about that.

Q But we went over to Claim 1 and you agree that it has a housing?

A Yes.

Q And LED linear form factor?

A Yes.

Q Which you told me is enclosed, correct?

A Yes.

Q Okay. And it has a cover that creates the full enclosure?

A Yes.

Q That cover is on the top part, correct? I can read the claim, if you want.

A Yes, it is what we call the top part. You



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

don't need to look it up. That is okay.

Q Okay. The claim is silent on the back of the housing, correct?

MR. HOFFMAN: Objection. Form.

Q I will rephrase. Claim 1 is silent as to what materials could be used as the back of the housing, correct?

A Claim 1 is silent, yes.

Q Claim 1 is also silent as to whether multiple different layers of materials can be used on the back of the housing, correct?

A Yes, it is silent in that regard.

Q Okay. You mentioned that Hasnain's experiment is open to the ambient, correct?

A Yes.

Q Can we read, please, column 6, line 54? So column 6, line 54 starts, Such an arrangement is shown in Figure 5, which is a cross-sectional view of another embodiment of a light source according to the present invention.

In light source 60 the cylindrical lens is mounted above the LEDs, right?

A Yes.

Q That is acting as a cover?

A Not necessarily. It is acting as a lens.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

We are not being told that it encloses.

Q So moving down a few lines, it says, Alternatively, the diffuser 26 shown in Figure 1B could be replaced by a diffuser having a cylindrical lens stamped on the diffuser?

A Yes.

Q Are you saying, so does that -- sorry. Strike that.

Let's review Figures 1A and 1B, please. If you can please go to column 2, line 45. Read lines 45 through 56.

A Okay.

Q So about line 53 it says, Light source 20 also includes a diffuser plate 26 that is not shown in Figure 1A, right?

A Yes.

Q Did you consider a diffuser plate to be equivalent to a diffuser cover?

A No.

Q Why not?

A First of all, these are prior art. These are fluorescent light tubes. And 26 is shown to be something bigger than the fluorescent light tube and therefore necessarily external to the fluorescent light tube and therefore not trapping the heat of the



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

florescent light tube.

Q Okay. If we go to Figure 5, we were having a discussion about column 6, and starting at line 54 all the way through line 68 it is talking about using a cylindrical lens?

A Yes.

Q And then below that it says, Alternatively, the diffuser 26 show in Figure 1B could be replaced by a diffuser having a cylindrical lens stamped on the diffuser.

Isn't Hasnain teaching that you can have a cover in his device?

A In Figure 5, yes. Let me be very specific. Holmes is basing his assertion of prior art on Hasnain's measurement of 30 degree C temperature rise, which is not Figure 5. It is Figures 2 and 3, which are clearly open air. They have no diffusion cover or no enclosure of any kind. Hasnain is not making any thermal claims relative to Figure 5.

Q Okay. But after Figure 3, even starting with Figure 3, Hasnain provides an additional heat dissipation surface, correct, 47?

A Yes, that is the one that we already discussed.

Q That is one way he is talking about



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

dissipating?

A That is not heat dissipation. It is a spreader. In the sense that I explained it, it is not dissipating heat to the ambient outside of the LED lamp. Dissipation means we are getting rid of the heat. Moving the heat through a spreader is not dissipation.

Q So let's look at column 4, line 52.

A Okay. The first sentence, It should be noted that heat dissipation structure 47 can transfer heat to the air.

Q That is conduction, correct?

A Yes, but he has no cover. His air is his laboratory air.

Q I understand that. But if you look at Figure 3, 47 is on the bottom of the device, correct?

A That is the spreader that is inside the cover.

Q The air is on the back contacting --

A Inside the cover, inside the LED tube.

Q Okay. I understand your position. So if we go down to column 4, line 58, we have a different type of heat dissipating structure anticipated by Hasnain, correct?

A Yes.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Q But I understand from your report that you believe that this is ineffective?

A It would never work. I stated several reasons.

Q Column 5, line 21, Light source 50 could also be applied with a heat-conducting adhesive that is applied prior to making the attachment of light source 50 to 25?

A Yes.

Q This is another manner of trying to manage heat disclosed by Hasnain, correct?

A It is aspirational.

Q Column 5, line 52, In one aspect of the present invention, the replacement LED light source has a plurality of LEDs mounted on a heat-dissipating substrate that has width that is less than or equal to the diameter of the fluorescent tube.

It goes on, Substrates are metal clad printed circuit boards in which the metal cladding provides the heat-radiating surface.

A He is misusing the term heat dissipating. He is describing a spreader. I understand that those terms might be interchanged, but strictly speaking he is not dissipating the heat as per the limitations of Claim 1 which requires a housing and a cover.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Q The last line of that paragraph starting at line 69 says, The goal of the LED placement is to provide sufficient heat dissipation to limit the temperature of the LEDs to less than 5 degrees C above ambient, correct?

A Yes.

Q So a POSITA would have a goal of getting to a temperature of not greater than 75 degrees C above ambient for Hasnain's devices, right?

A No, a POSITA would disregard that statement as being incorrect. There is a lot of incorrect stuff in Hasnain that a POSITA has to be very careful about.

Q Line 6, excuse me. Column 6, line 27, The above-described embodiment of the present invention have utilized a design requirement that the temperature rise of the LEDs is held to less than 75 degree C over ambient. Also incorrect?

A Yes. We just discussed this an hour ago.

Q Let us go on. For example, the replacement light sources could be constructed such that the maximum increase in temperature over ambient is 20, 30, 40, 50 60 or 70 degrees C, correct?

A Very misleading. Incrementally with each increment of ten degrees. He is already suggesting that we are 47 degrees C too hot.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Q Okay. Let us talk Ducharme for a few minutes.
A Okay.
Q I am giving you Exhibit 1005 which is the Ducharme reference.
A Okay.
Q Can you go to Figure 5A of Ducharme?
A Okay.
Q So if you want to read about Figure 5A, that is fine.
Figure 5A is a picture of the lighting device disclosed by Ducharme?
A Yes.
Q 5000. It has an upper portion 5003. Let me get you cites for this so you don't have to believe me. Read column 12, line 49 through column 13, line 12. Let me know when you are ready.
A Okay.
Q So Figure 5A appears to have a fixture 5000 and upper body 5003, LEDs 5007, platform 5005 and lower body 5001, correct?
A Yes.
Q Did you consider this embodiment in your analysis?
A Yes.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Q Can you show me?
A I didn't discuss it in my declaration. I don't know what you mean by -- you asked me, did I read all of the prior art? Yes, all of it. So I considered it.
Q Sorry. I am probably confusing you. I apologize.
Did you, in conducting your analysis and preparing your report, consider this disclosure of Ducharme?
A You mean this figure?
Q That's correct.
A No.
Q Okay.
A If you are going to leave it at that I will qualify my answer. Ducharme was not cited for thermal management. It was cited for more than that and --
Q We will move on. If you can go to Claim 1 of --
A Let me clarify.
Q No, let us move on.
A No --
Q He can ask you questions --
A I am not finished with my answer.
Q -- when it is his turn. You already did



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

finish your answer.

A No, I didn't. Before you start asking another question, let me further clarify.

What is shown in here is air slots. I know it to be ineffective. They provide some cooling, an order of magnitude factor of less than 10, less than good thermal management heat. I do not want to leave you with the impression that is a thermal management solution. It is not.

Q Okay. What are effective thermal management solutions in the context of that figure?

A Surface area.

Q Corrugation?

A That is one way, relatively ineffective way to get surface area.

Q Okay.

A Again, a corrugation, I don't know what kind of a corrugation will provide up to 50 percent increase in surface area. We need a factor of 10 increase of surface area. That is what heat vents provide.

Q So Claim 1, this is going to extend a while.

Do you want to do lunch?

A Your call.

Q It is noon. That is why I am asking.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Unless David is hungry, we can keep going.

MR. HOFFMAN: We can keep going.

Q So if you can please go to Claim 1 of the '582 patent, which is in column 12.

There are no power supply requirements recited in Claim 1, correct?

A I believe there are.

Q Okay. Can you point them to me?

A Can you specify what you mean by power supply requirements?

Q Why don't we look at Claim 10. It says, the LED light system of Claim 1, further comprising a power supply configured to provide at least 20 watts.

A There is no corresponding power supply requirement. It is saying further comprising 20. That is the additional limitation by Claim 10.

Q But there is no minimum power supply recited in Claim 1, correct?

A We have in Section D circuitry mounted to the support structure including an LED driver circuit. That is the power supply.

Q But no minimum wattage specified?

A Not in Claim 1.

Q What I want to ask now is whether there is a minimum wattage requirement specified in Claim 1?



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A No.
Q There is also not a maximum wattage supply specified in Claim 1?
A No.
Q There is also no minimum device lifetime that I see in Claim 1.
Do you see one?
A By inference.
Q Okay.
MR. HOFFMAN: Objection. Scope.
A By inference, that is my answer.
Q So what do you mean "by inference"?
A Well, in claim element J of Claim 1 we are claiming that it is suitable for the commercial image recording.
Q Okay.
A And that is what infers to me long-life stable operation.
Q Like the 40,000 hours Mr. Macias put right below example three?
A What is your question?
Q I am asking if you think the commercial image recording lifetime includes the 40,000 hours specified in the spec below example three?
MR. HOFFMAN: Objection. Scope.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A I would say that that is overly specific. I don't think 40,000 or any other number is required. What the 40,000 assertion in the specification of Macias is telling a POSITA is, I have solved it. You can solve it.

Q Can you go to paragraph 44 of your declaration, please? All right. On page 31, in the middle of the page, there is a quote from Cree.

A Yes.

Q It says, x-Lamps X-RE LEDs are rated to provide an average of 70 percent lumen maintenance after 50,000 hours.

Do you see that?

A Yes.

Q Did you use a 50,000 hour requirement when you were figuring out whether the prior art was sufficient?

A The prior art is so insufficient by an amount exceeding 50 degrees C. To argue whether we have 40,000 hour life or 50,000 hour life is insignificant on that scale.

Q So no, you didn't apply 50,000 hours? I do not understand the answer.

Did you apply 50,000?

A I do not understand the question.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Q My question is, did you apply a 50,000 hour lifetime requirement in evaluating whether the prior art was sufficient?

A Not specifically but indirectly. So I need some long lifetime, not necessarily 50,000, not necessarily 40,000, but to be suitable for the commercial imaging recording application it requires some long life.

Q Do you have a minimum number in mind?

A It is a continuum. What does the customer need? It varies from customer to customer.

Q Would 5,000 hours be sufficient in some cases?

A If my customer only needed 5,000 hours, that is what I would design to.

Q Okay. So sticking in Claim 1, if you want to go back there and make sure that is in front of you.

Earlier we discussed the meaning of comprising and you agreed that it is open-ended, right?

A Yes.

Q So it does not preclude the use of a fan, correct?

A Correct.

Q It does not preclude the use of, for instance, heat dissipating structures like fins?



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A Correct.
Q Let's look at the background of the '582 patent which begins in column 1 at line 15.
A Is there a section that I should read?
Q I think if you started reading around column 1, line 58 through column 2, line 8, that would be a good start.
A Okay.
Q So starting in column 2, line 2, it says, The two most frequently used and desired color temperature ranges in the lighting industry for stage and set lighting have been found to be 3050 to 3300 K for tungsten (warm white) and 5400 to 5600 K for daylight white, correct?
A Correct.
Q Do you agree?
A Yes.
Q Okay. So then if you go down to column 2, line 36.
A I agree with a caveat, if you don't mind.
Q Be my guest.
A We later say that refers to, I believe we say later, and I just want to make sure that we are not overly restricting, that more pertains to anything below 3500 K.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Q Sure. I understood. So if you could please read column 2, line 36 to 42.
A Okay.
Q There are two primary types of LED lighting used to create white light. One is to use individual LEDs that emit three primary colors, red, green, and blue and mix the colors to form white light.
Right?
A Yes.
Q And you agree with that?
A Yes.
Q And that was well-known before the '582 patent?
A Yes.
Q Okay. The other then, the patent goes on, start on column 2, line 39, The other is to use a phosphor material to convert monochromatic light from a blue or ultraviolet LED to broad-spectrum white light, also referred to as phosphor based LEDs.
That is what it says, correct?
A Yes.
Q Do you agree with that?
A Yes.
Q And well-known before the '582 patent?
A Yes.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Q The words broad-spectrum white light occur in the claims as well.
Do you remember that?
A I think it said broad-band.
Q I don't think so. If you want to read Claim 1 and just confirm.
A Okay. I was about to say that they are equivalent in my mind.
You are right. I am sorry. Okay.
Q What do you understand broad-spectrum white light to mean in the context of Claim 1?
MR. HOFFMAN: Objection. Form.
A Broad spectrum in the context of Claim 1 is as regards to the application of commercial image recording. And so broad spectrum in that regard means that we have to have all colors represented throughout the visible spectrum, which is nominally 400 nanometers to 700 nanometers from violet to red. So broad spectrum means that we are providing light at all colors or wavelength in the white light spectrum.
Q Okay. Are you good?
A Yes.
Q Next paragraph, column 2, line 43. I am going to read it out loud. In order to match the tubular form of a fluorescent bulb, arrays of LEDs may



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

be placed within a tube having the same form factor as a fluorescent lamp, such as T8 or T12 size fluorescent bulb. One such bulb is made by Dialight and is called DuroSite.

Do you see that?

A Yes.

Q Were you familiar with Dialight or the company, excuse me, the company Dialight or the bulb DuroSite?

A I was at the time. I was aware of most new things that came out, and these names do ring a bell.

Q Again, since this is in the background of the patent application, this is before the '582 patent, correct?

A Yes, I believe so.

Q For example, in size T8 the bulb in one form using SMD LEDs in a four foot long tube and provides 1500 lumens of natural white light, using 17 watts, 300 LEDs, with 90 volts to 277 volts, and is ETL/ UL approved.

What I just read from column 2, line 46 through 50 is correct?

A Yes.

Q So they are already getting 1,500 lumens of natural white light, correct?



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A Well, not suitable for commercial image recording application.

Q Because of the CRI and magenta and green requirements or something else?

A Very likely. If they are not saying that they have greater than 90 CRI, less than five points green, a POSITA would understand that most likely they did not at this time.

Q Okay.

A In fact, the problem that we state that we are solving is that LEDs at the time of the invention were typically green, and typically provided very poor color of skin. Here is an example of a product that was put out not for commercial recording image recording and rather is more typical of the products at the time.

Q I understand. Line 55 to 56, it says, Sufficient intensity of the light is preferably at least 1,000 lux for such an application.

Do you see that?

A Yes.

Q What is the difference between 1,000 lux or in lumens, not lux. What is -- strike that. I will start over.

What is the difference between lux and



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

lumens, if anything?
A This gets technical. They are very different. I believe that this is used properly.
Q Okay.
A In this instance, lux is simply lumens per square meter. So if I am illuminating a 10-square meter section of the stage, each of my lights puts out 1,000 lumens onto that 10 meters, and I am going to need ten of those lights. So one is brightness and the other is total flux.
Q Okay.
A Brightness not being the right technical term. It is illuminates is what lux refers to.
Q Okay. So if we go back to example one of the '582 patent and we recall that Mr. Macias at line 39 of column 10 said he used a total of 560 LEDs; do you see that?
A I see a total of 576 LEDs.
Q Yes. A total of 576?
A Yes.
Q So that is nearly double the amount of LEDs that was in the 300 we just saw in the prior art, correct?
A Which prior art?
Q The Dialight device. The Dialight device



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

had 300 LEDs, was 90 volts to 277 volts, column 2, line 49.

A Okay.

Q So in recognition of bicolor it appears that Mr. Macias grabbed white, grabbed tungsten and doubled the number.

Isn't that mere optimization?

A I don't know what you mean by grabbed white.

Q White light was already known, correct?

A Yes.

Q Bicolor was already known, correct?

A Yes.

Q So now we have a prior art device with 300 LEDs in it that does white?

A Yes.

Q And now we have 576 LEDs that does white and tungsten?

A That is misrepresenting. The 300 LEDs did a very poor color quality of white, not suitable for commercial image recording.

Q I am not saying that it is. I am saying that the number is basically doubled.

A You are inferring that they are equivalent and they are not.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Q I am inferring what is equivalent?
A You are inferring the white light from Dialight is equivalent from the white light of the example two.
Q I didn't mean to infer that.
A I just wanted to clarify that.
Q Sure. All right.
Was it typical in, let us say, 2010 to be able to buy residential lighting in a T8 or T12 format and achieve over 1,000 lumens?
A No, not in 2010.
Q I am going to give you about five exhibits then. These are new exhibits.
A Okay.
Q The first is 1033. They are marked at the bottom. These are new exhibits. This is from a thing called the Wayback Machine which Mr. Hoffman is well aware of.
If you look at the URL at the top, do you see it says 2010/02?
A Okay.
Q That is February 2010 according to the Wayback Machine standard.
A Understood.
Q I have got down here right below the green



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

bar, it says T12, T8 LED tube light four foot, 15 watt?
A Yes.
Q And then right below that there is a whole bunch of boxes, but there is a text that describes that product and it says, LED T12, T8 Tube light, 300 LEDs 1500 lumens. This is 2010?
A Yes.
Q So, again, I think things on the internet can be bought for residential purposes?
A No.
Q No?
A No. There was so much junk being -- this does not tell us who the manufacturer is, right? It most likely is not a reliable manufacturer and so the Environmental Protection Agency and the Department of Energy started coming in in the 2010s to get these, get this junk out of the market. So they can say 1500 lumens. They can say a certain CRI. It's likely and I cannot -- I haven't worked with this lamp, but it is very likely they are not getting what they are claiming. You may also be getting a CRI even less than 70.
Q All I was asking about is lumens. So 1500 lumens 2010, but you say this is unreliable?
A I would expect that to be -- you asked for



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

residential applications. This would be unsuitable for residential applications. The color quality, I am speculating, but I am an expert, I have been there, I experienced all of this real time and hands on, the color quality would have been horrible. You would not use it in a residential application.

Can somebody put out an LED type with 1500 lumens, yes. With 10,000 lumens? Yes, but it is going to be overheated and have a very short life or it is going to be very poor color quality or all of the above and very likely all of the above.

I would dismiss this -- we ran across this stuff as employees of GE Lighting. Here is what we have to compete against. The specs are wrong. When we spec something, when I say 1,000 lumens in 2010, I mean 1,000 lumens that you can trace back to the NIST. It is true 1,000 lumens. I don't believe this would be.

Q I am going to continue reading.

A I thought I had dismissed it.

Q Great for business lighting, home lighting, accent lighting and office lighting.

You don't agree with that?

A They can say whatever they want. These claims were shown by institutions within the industry to be problematic, poor quality.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

And let me just add one layer since you keep pressing this. The LED industry was following on to the compact florescent light industry, CFL industry, which consumers rejected outright. Very poor quality, flickering, humming, very short life.

Because of products like this that were put out there, not because of GE or Phillips or Sylvania who were testing to make sure that they had the performance they were claiming, but these other companies out there that does not meet the performance claims. The Department of Energy and EPA started putting out very strict regulations that this kind of stuff is not going to be allowed. You are going to require labeling that says you met EPA and DOE specifications. I am certain that this would not have.

Q Okay. Were you familiar with the company LEDLight.com?

A No.

Q We will just stick with the one then.

A There are so many low-quality lighting companies, and they are still not cleared out of the system yet.

MR. BRIGGS: So I think this is a good place for a break because I want to review your reexam declaration before you go today because I need to be



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

able to ask questions about it.

So did you send that to me?

MR. HOFFMAN: I have links to it that I can forward to you, but I just want to make sure that there is nothing attorney-client privileged in what I have or work product. Let me see here.

MR. BRIGGS: Should we go off the record, David?

MR. HOFFMAN: Yes, let us go off the record.

(Lunch recess was taken.)

Q (BY MR. BRIGGS) Welcome back from lunch, Dr. Allen.

Did you guys discuss -- did you discuss the substance of your testimony at all over lunch?

A Not my testimony, no.

Q Okay. I went through your, a couple of your reexamination declarations that Mr. Hoffman sent me and I am not going to have any questions on those at this time.

A Okay.

Q I only have a few more questions. There were several declarants besides yourself in these two IPRs.

Do you know that?

A Others submitting declarations on behalf of



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Colt?
Q That's correct.
A I believe I know that.
Q For instance, Mr. Csernecky submitted a declaration?
A Well, I read that one.
Q That is one instance. Do you know Mr. Csernecky by any chance?
A No.
Q So another person who submitted a declaration is Kevin Baxter.
Do you know Kevin Baxter?
A No.
Q Another person who submitted a declaration is a Fernando Silva.
Do you know Fernando Silva?
A No.
Q Another person who submitted a declaration is a gentleman named Bruce Wunderlich.
Do you know Mr. Wunderlich?
A No.
Q The last person who submitted a declaration who I have not already mentioned is a person named Ken Fischer.
Do you know Mr. Fischer?



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A No.
MR. BRIGGS: I have no further questions.
MR. HOFFMAN: Okay. I would like to take about a ten-minute break and then I will have some redirect.
(Recess was taken.)
REDIRECT EXAMINATION
BY MR. HOFFMAN:
Q Dr. Allen, is there anything in your past declarations, to the best of your knowledge, inconsistent with the current declarations that you have done of Exhibit 2080?
MR. BRIGGS: Objection. Form.
A Can you repeat it then, please?
Q Sure. Is there anything in the past declarations you have done for Colt in reexaminations and/or patent prosecution for Colt that is inconsistent with anything in your current declarations of Exhibit 2080, in the two IPR proceedings we have been talking about?
A No, no inconsistencies.
Q In your time and experience at GE with the patent review group you mentioned earlier, did you consider obviousness of patents over the prior art?
A Yes.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

Q In the analysis that you have done in providing your declarations of Exhibit 2080, did you consider obviousness of the prior art?
A Yes.
Q Did you consider it from the point of view of a POSITA?
A Yes.
Q Did you consider it at the time of the invention?
A May 17, 2013, yes.
Q In your work in the GE patent review committee, did you review any LED lighting devices in patents that were for commercial image recording?
A I don't recall any specific, but I am fairly sure that I did because I was responsible for a very broad range, the entire broad range of IP that we were considering.
Q In considering and setting forth your opinions in your declarations of Exhibit 2080 in these IPR proceedings, did you read and consider all of Claim 1, including all of its elements of the ''582 patent?
A Yes.
Q And then I am going to ask you the same question with respect to the '895 patent. So your review in these -- in your consideration of your



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

opinions and setting them forth in your declarations of Exhibit 2080 for both IPR proceedings, did you read and consider all of Claim 1 and all of its elements of the '895 patent?

A Yes.

Q Okay. I want to direct your attention, Dr. Allen, to Exhibit 1001 which you should have a copy of in front of you. You should have one over there.

A Okay. I have it.

Q I want to direct your attention specifically to column 6 and line 31 through 33. Just take a moment to read that.

A Okay.

Q Now, what is your understanding with respect to whether or not the mention of clear in that sentence is diffusing or not?

A Well, the way the sentence is constructed it clearly says that a clear which acts to diffuse the light. So even though it is clear, it is diffusing the light.

Q Would a POSITA reach the same conclusion or a different conclusion?

A One has to reach that conclusion saying it acts to diffuse the light.

Q Is there anything in your testimony today or



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

any document that you have seen today that changes your opinions in your declarations of Exhibit 2080 in either IPR?

A No, nothing.

Q Now I want to direct your attention, Dr. Allen, back to Exhibit 1001 which is a copy of the ''582 patent and specifically example one which is in column 10. And in that example or, actually, below that example, lines 38-39, I just want to read that real quick. It says, By diameter of 41 millimeters, there would be four LEDs over the width and 144 LEDs long, for a total of 576 LEDs.

Do you see that?

A Yes.

Q Does anything about using 576 LEDs tell you anything about thermal management?

A Yes. If I were a POSITA reading this, I would understand that the inventor was probably using as many LEDs as possible. When you use a high number of LEDs, then each LED has to carry less current. And so it is not challenging, it is specified current and therefore has longer life and it has higher performance, and it has better color and it has better efficacy.

Q Okay. Dr. Allen, in reviewing the Hasnain



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

patent -- I just want to get you the exhibit number for that. I believe it is 1008.

So in reviewing the Hasnain patent, 1008, did you review the embodiment of Figure 3 and Hasnain's discussion in column 4, lines 41-51 in considering your opinions?

A The lines again, please?

Q Column 4, lines 41 through 51.

A Yes.

Q Had you expressly mentioned that Figure 3 and/or column 4, lines 41 through 51 of Hasnain in your opinion, would it have changed your opinions at all?

MR. BRIGGS: Objection. Form.

A No, it would not change my opinion. And, by the way, I did scrutinize every line of Hasnain. I assimilated all of Hasnain into my analysis.

Q Okay. Now, I want to direct your attention to the patent of Ducharme, which is Exhibit 1005.

Did you consider the embodiment of Figure 5A in reviewing Ducharme for purposes of your declaration?

A Yes.

Q If you had expressly mentioned the embodiment of paragraph 5A of Ducharme in your declaration of Exhibit 2080, would it have changed any of your conclusions at all?



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

A No. The reason is because the thermal management opportunity expressed in Figure 5A is inconsequential.

Q Would the embodiment of Figure 5A have changed any of the opinions in your declaration of Exhibit 2080?

A No, none.

Q Would the embodiment of Figure 3 in column 4, lines 41 through 51 of Hasnain, Exhibit 1008, have changed any of the opinions in your declaration of Exhibit 2080?

A Repeat it again, please.

MR. HOFFMAN: Can the reporter read that back, please.

(The question was read.)

Q Let me reask that question.

Does the embodiment of column 4, lines 41 through 51 in Figure 3 of Hasnain change any of the opinions you have expressed in your declaration of Exhibit 2080 in either IPR?

A Not at all. I have scrutinized those lines. I understood them.

Q Now, you were talking earlier in your testimony, Dr. Allen, about whether or not Claim 1 precludes the use of fans or fins.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

I want to direct your attention to Claim 1, Element F as in Frank.

A Okay.

Q Do you see where that element mentions a fluorescent form factor?

A Yes, a linear form factor of a fluorescent light tube lamp.

Q Is it your understanding that if one were to add fans or fins to the elements of Claim 1 that one would still have to come within a fluorescent form factor?

A Yes, that is exactly what it says.

Q Does a fluorescent form factor have to be exactly round?

A No.

Q Okay. I want to direct your attention to the ''582 patent, column 1, lines 47 through 50. That is Exhibit 1001.

A Okay.

Q So I am directing your attention to column 1, lines 47-50 of Exhibit 1001, which is the ''582 patent and would you just take a moment to read those lines to yourself.

A I have done that.

Q Okay. What is your understanding of cool



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

color temperatures from that portion of the patent?

A It says explicitly color temperatures over 5000k are considered cool colors. I agree with that.

MR. HOFFMAN: Okay. I have nothing further.

MR. BRIGGS: No recross.

(The deposition concluded at 2:14 p.m.)



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

C E R T I F I C A T E

I, MICHELE KOSS, a Shorthand Reporter and notary public, within and for the State of Colorado, do hereby certify:

That GARY ALLEN, Ph.D., the witness whose examination is hereinbefore set forth, was first duly sworn by me and that this transcript of said testimony is a true record of the testimony given by said witness.

I further certify that I am not related to any of the parties to this action by blood or marriage, and that I am in no way interested in the outcome of this matter.

IN WITNESS WHEREOF, I have hereunto set my hand this 23rd day of April, 2024.

Michele Koss

Michele Koss, RMR, RPR



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

ESQUIRE ERRATA SHEET

Esquire Job ID: J11077930

Case Caption: Quasar Science vs. Colt International Clothing

DECLARATION UNDER PENALTY OF PERJURY

I declare under penalty of perjury that I have read the entire transcript of my Deposition taken in the above-captioned matter or the same has been read to me and the same is true and accurate, save and except for changes and/or corrections, if any, as indicated by me on the DEPOSITION ESQUIRE ERRATA SHEET hereof, with the understanding that I offer these changes as if still under oath. Signed on the _____ day of _____, 2024.

_____

GARY ALLEN, Ph.D.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

DEPOSITION ERRATA SHEET

Page No._____Line No._____Change to:_____

_____

Reason for change:_____

Page No._____Line No._____Change to:_____

_____

Reason for change:_____

Page No._____Line No._____Change to:_____

_____

Reason for change:_____

Page No._____Line No._____Change to:_____

_____

Reason for change:_____

Page No._____Line No._____Change to:_____

_____

Reason for change:_____

Page No._____Line No._____Change to:_____

_____

Reason for change:_____

Page No._____Line No._____Change to:_____

_____

Reason for change:_____

SIGNATURE:_____DATE:_____

GARY ALLEN, Ph.D.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

DEPOSITION ERRATA SHEET

Page No._____Line No._____Change to:_____

_____

Reason for change:_____

Page No._____Line No._____Change to:_____

_____

Reason for change:_____

Page No._____Line No._____Change to:_____

_____

Reason for change:_____

Page No._____Line No._____Change to:_____

_____

Reason for change:_____

Page No._____Line No._____Change to:_____

_____

Reason for change:_____

Page No._____Line No._____Change to:_____

_____

Reason for change:_____

Page No._____Line No._____Change to:_____

_____

Reason for change:_____

SIGNATURE:_____DATE:_____

GARY ALLEN, Ph.D.



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

## 1

**1**
25:5 29:5 31:24 32:4,11, 25 38:16, 18 40:9, 13,16 41:5 45:18,21 49:19,25 66:6 69:7,10, 11 70:5 78:22,24 86:21 97:21,22 98:6,11, 13 99:5, 8,9 103:25 106:18 107:22 108:3,6, 12,18,23, 25 109:3, 6,13 111:16 112:3,6 114:6,11, 13 126:21 127:3 130:24 131:1,9, 17,21

**1,000**
84:18 85:1,5 86:4,13, 15,23 87:22,23, 25 88:3 116:19,22 117:8 119:10 121:15,17

**1,044**
58:6

**1,500**
115:24

**1.5**
81:10

**10**
45:25 51:16 81:5 107:6,19 108:11,16 117:8,16 128:8

**10,000**
121:8

**10,411,582**
46:10

**10-square**
117:6

**100**
49:6 51:5,9 54:25 55:8 63:10 64:6,23

**1001**
32:20,21 41:25 46:15 47:7 51:25 127:7 128:6 131:18,21

**1003**
46:18,22

**1004**
46:25

**1005**
47:5 105:4 129:18

**1006**
47:10

**1007**
47:13,14

**1008**
47:17,19 92:13 95:1 129:2,3 130:9

**1010**
84:7

**1033**
119:15

**11**
32:1 33:5,16 45:19 88:8

**1107**
84:6

**12**
33:1 39:19 48:1 67:20 105:16 108:4

**13**
71:16,23 72:4 105:16

**144**
128:11

**15**
41:11,17 44:22 54:10 66:1 112:3 120:1

**150**
75:24

**1500**
115:18 120:6,17, 23 121:7

**17**
41:19 42:7,11 43:4,5 115:18 126:10

**18**
29:5 61:21,23, 24 62:10

**19**
4:2 47:22 48:1 49:25 62:22

**1974**
18:4

**1975**
18:6

**1977**
17:24

**1980**
17:23

**1987**
18:16

**1A**
36:8,13, 16,20 37:6,13 69:14 81:12,15 100:9,15

**1B**
36:5 38:10,11 100:3,9 101:8

**1C**
38:10,12

**1E**
69:21

**1F**
71:1

## 2

**2**
25:5,24 42:6 56:11 60:14,15 76:10 78:4,18, 20 92:21, 22 100:10 101:16 112:6,9, 18 113:2, 16 114:23 115:21 118:1

**2.8**
83:2

**20**
49:3,5 51:6,10 53:25 54:5 66:1 100:13 104:21 108:13,15

**20-digit**
56:22

**2007**
74:16



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

**2009**
62:24

**2010**
74:19,22
75:1,10
77:8
119:8,11,
22 120:6,
24 121:15

**2010/02**
119:20

**2010s**
120:16

**2012**
42:11
43:5
56:1,2
62:20
65:10,17
72:23
73:10
74:3,6
77:18

**2013**
41:19
42:8 43:4
59:11
62:24
64:15
74:19,22
75:1,10
77:8
126:10

**2016**
18:17
74:16,17,
21 75:5,8
78:1,5

**2022**
13:18

**2023-00613**
23:17

**2024**
4:2

**2041**
67:18

**2080**
8:19,21,
24 9:1,21
10:4
12:8,14
13:10,22
14:19
17:2
18:13
25:6
78:12
79:3
125:12,19
126:2,19
127:2
128:2
129:24
130:6,11,
20

**2081**
55:20,22
60:2,3,10
75:20
77:12

**2083**
71:6,8,16

**21**
29:5
49:12,18
62:5
64:18
103:5

**22**
50:8
53:17
90:24
91:2

**23**
54:7 66:2
92:16
95:1

**24**
29:5
58:14
63:21
91:25

**25**
58:5
103:8

**26**
59:19,24
60:5
100:3,14,
22 101:8

**27**
29:5
104:13

**277**
115:19
118:1

**28**
62:2

**28A**
62:5

**29**
61:24
62:10

**29A**
62:5

**2:14**
132:6

**3**

**3**
29:5
94:19
101:16,
20,21
102:16
129:4,10
130:8,18

**3.5**
83:2

**30**
20:5
47:25
51:5
62:1,22
64:9
94:25
101:15
104:21

**300**
63:11
115:18
117:22
118:1,14,
19 120:5

**305**
31:19,20

**3050**
112:12

**30A**
62:5
64:18

**31**
29:6 52:1
74:13
75:16
78:12
110:7
127:11

**32**
94:20,23

**33**
79:2
127:11

**3300**
112:12

**34**
79:10
94:17,19,
24,25

**3500**
112:25

**36**
92:19
96:24
97:5
112:19
113:2

**37**
88:8
93:1,6

**38**
19:22
20:4,5
66:10
79:23
88:8

**38-39**
128:9

**39**
80:7
113:16
117:15

**4**

**4**
26:20
33:1
92:16
93:6,23
95:1 96:3
102:8,22
129:5,8,
11 130:9,
17

**4.9G**
61:16

**40**
51:5
104:21



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

**40,000**
85:18,22
88:7
89:19
90:10
91:11
109:19,23
110:2,3,
20 111:6

**40,000-hour**
90:4

**400**
114:17

**41**
70:13
92:16
93:19,21,
22,23
128:10
129:8,11
130:9,17

**41-51**
129:5

**42**
68:21,24
69:4
71:20
80:15
95:1
113:2

**43**
71:4,21
114:23

**44**
74:10
78:11
110:6

**44-inch**
82:21

**45**
100:10

**46**
19:10,13
115:21

**47**
94:2 96:2
97:4
101:22
102:10,16
104:25
131:17

**47-50**
131:21

**48**
79:3

**48-inch**
82:21

**49**
79:11
105:16
118:2

**5**

**5**
46:7
48:11,20
49:22
58:17
59:11
61:12
76:23
92:1,6
99:18
101:2,13,
16,19
103:5,13
104:4

**5,000**
111:12,14

**5-step**
49:21

**50**
64:9,10,
11 103:5,
8 104:21
107:18
110:19
115:22
131:17

**50,000**
110:12,
15,20,22,
24 111:1,
5

**5000**
105:14,19

**5000k**
132:3

**5001**
105:21

**5003**
105:14,20

**5005**
105:20

**5007**
105:20

**51**
129:8,11
130:9,18

**52**
102:8
103:13

**528**
52:9 67:7

**53**
79:23
100:13

**54**
80:7
99:16,17
101:3

**5400**
112:13

**55**
116:17

**56**
100:11
116:17

**560**
117:16

**5600**
112:13

**576**
82:22
86:12
92:7
117:18,19
118:17
128:12,15

**58**
102:22
112:6

**582**
32:5,22
33:7
41:25
42:23
46:12,16
49:19
52:3 59:7
68:9
69:8,12
78:19,24
81:5
88:18
89:11
91:7 92:2
108:4
112:2
113:12,24
115:13
117:15
126:21
128:6
131:17,21

**59**
80:16

**5A**
105:7,9,
11,19
129:19,23
130:2,4

**5G**
61:16

**6**

**6**
28:8 29:5
40:3 41:2
45:23
52:1
99:16,17
101:3
104:13
127:11

**6-7**
39:21

**60**
51:6
99:21
104:22

**61/648,554**
42:11

**613**
9:6,20

**614**
9:8 10:13

**62**
72:14

**68**
101:4

**69**
104:2

**7**

**7**



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

31:25
33:8
38:10
40:3 41:2
57:24
58:3,8

**7,507,001**
46:25

**70**
49:6
51:6,9
54:25
55:8
64:23
104:22
110:11
120:22

**700**
63:13,17
114:18

**73**
9:25

**74**
10:14

**75**
17:2,13
104:8,16

**76**
18:12

**8**

**8**
27:11
46:4
51:16
112:6

**8,608,347**
20:2

**8,613,530**
20:2

**80**
13:11,21
63:22
75:10,17
77:2,9
78:6

**85**
58:5
76:11,14
77:2,11

**895**
126:24
127:4

**9**

**9**
28:7
29:21
31:8
39:17,19

**90**
48:12
49:23
59:14
62:16,19
63:19
115:19
116:6
118:1

**92**
18:25

**A**

**ability**
73:15

**above-described**
104:14

**absolutely**
51:2

**absorbing**
51:5,7

**absorption**
50:23

**accent**
121:21

**acceptable**
14:3
72:14

**accidentally**
9:23

**acclaimed**
50:20

**account**
79:12,15,25

**accurate**
61:4

**achieve**
54:15
63:19
64:25
88:3
90:18
119:10

**achieved**
48:25
63:7 88:4
90:17

**acting**
99:24,25

**acts**
52:20
53:5
127:18,24

**add**
74:2
86:12
122:1
131:9

**added**
50:2

**adding**
97:5

**addition**
50:4

**additional**
44:5 72:8
93:25
94:1,21
95:8,9,14,23,24
96:12
101:21
108:16

**address**
48:12

**adds**
97:4

**adhesive**
103:6

**advance**
14:5

**advent**
62:25

**Agency**
120:15

**aggregate**
88:2

**agree**
54:21
60:16
68:3,5,8
95:7
98:13
112:16,20
113:10,22
121:22
132:3

**agreed**
33:4
38:17
111:19

**ahead**
27:12
35:14
41:14
59:18
71:5,16
92:15

**air**
67:1
97:10,12,15 101:17
102:11,13,14,19
107:4

**Allen**
4:1,3,7
8:13 10:8
17:6,9,11
25:9
29:20
37:3 81:4
123:12
125:9
127:7
128:6,25
130:24

**Allen's**
10:3

**allowable**
75:11

**allowed**
6:25 7:15
97:11
122:13

**alternating**
81:11

**Alternatively**
100:3
101:7



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

**aluminized**
20:1,9,10

**aluminum**
88:22
89:1,5,7,
10,19
90:9,11,
20 91:12

**ambient**
67:1
72:10,13,
17,25
80:1
99:14
102:4
104:5,9,
17,21

**amount**
110:19
117:21

**analysis**
28:20
36:12,16
38:18
69:3 71:1
74:6
80:3,5
87:19
94:5
95:14
96:13
105:24
106:8
126:1
129:16

**analyze**
42:14,18

**analyzing**
74:7

**and/or**
45:15
125:17
129:11

**annoying**
50:25
51:3
67:15

**answering**
11:23
77:15

**answers**
11:23

**anticipated**
102:23

**anticipation**
22:19
23:1

**apologize**
26:4
67:15
68:2
106:7

**appears**
9:16
13:24
105:19
118:4

**application**
21:1
42:2,11,
14,22
43:4
51:2,24
72:15
82:4
111:7
114:14
115:13
116:2,19
121:6

**applications**
16:6
19:24
27:7 42:7
66:22
121:1,2

**applied**
25:19
31:7 61:7
103:6,7

**apply**
38:2
55:14
91:17
110:22,24
111:1

**applying**
23:22
55:16

**approved**
115:20

**approximately**
19:7 33:1
70:13

**April**
4:2

**area**
97:7
107:12,
15,19,20

**argue**
110:19

**Argumentative**
36:14,17
39:3 87:3

**arrange**
24:15

**arrangement**
24:18
99:17

**arrays**
114:25

**art**
11:1,3,12
23:3,4,
12,16
25:16
28:15
31:15,17
43:13
74:7,9
79:16
95:15
96:14
100:21
101:14
106:4
110:16,18
111:2
117:22,24
118:14
125:24
126:3

**aspect**
35:24
38:23
58:10
91:21
94:4,22
96:22
97:24
103:13

**aspects**
14:11
20:21
37:23

**aspirational**
103:12

**assembly**
94:25

**assert**
55:25

**asserting**
95:4

**assertion**
101:14
110:3

**asserts**
29:4

**assessing**
31:10

**assimilated**
129:16

**assume**
26:5
41:18,21
87:15
91:17

**assumed**
84:6

**assuming**
80:17

**assumptions**
82:13

**astrophysical**
17:23,24

**attachment**
103:7

**attempts**
75:13

**attention**
127:6,10
128:5
129:17
131:1,16,
20

**attorney**
4:10
21:24

**attorney-client**
123:5

**attributes**
76:20

**average**



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

110:11

**aware**
15:18,25
68:14
115:10
119:18

**B**

**Bachelor**
43:14,19

**bachelor's**
18:3

**back**
13:10
17:1 25:4
28:25
29:19
30:1,14,
15,20,23
37:25
45:23
53:17
69:8 70:4
75:20
77:4 81:3
88:13
98:8
99:2,6,11
102:19
111:17
117:14
121:16
123:11
128:6
130:14

**background**
112:2
115:12

**backing**
70:15

**backwards**
87:18

**bad**
48:1

**band**
64:9

**bar**
120:1

**based**
20:16
23:10
28:15,16
31:6
60:20
61:4
86:16,25
113:19

**basically**
9:16
118:23

**basing**
101:14

**Baxter**
124:11,12

**begins**
112:3

**begun**
55:5

**behalf**
123:25

**Behr**
50:22

**bell**
115:11

**bench**
49:8

**benchtop**
76:4
93:11,14
96:23
97:10

**bicolor**
16:9,12,
16 67:6,
24,25
68:9,11
118:4,12

**bigger**
97:6,9
100:23

**bin**
57:6

**binning**
56:25
57:2

**bins**
56:14

**black**
58:24
59:1,3,5
78:14

**blend**
50:12

**blue**
58:25
72:6
113:7,18

**board**
96:25

**boards**
103:19

**body**
58:24
59:1,3,5
105:20,21

**bold**
82:13

**bother**
71:10

**bottom**
8:22 10:6
37:16,19
56:2
61:23
69:9
70:12
75:16
102:16
119:16

**bought**
120:9

**box**
72:5

**boxes**
120:4

**break**
7:5,11
14:3,24,
25 36:25
37:4
60:25
80:20,23
122:24
125:4

**breaks**
7:17

**breakthroug h**
63:3

**briefly**
81:17

**Briggs**
4:6,9
8:17
14:23
15:2
28:25
29:12,16
30:13,20
34:7
36:23
39:4
80:25
122:23
123:7,11
125:2,13
129:13
132:5

**bright**
50:25
51:2,18

**brightness**
117:9,12

**broad**
63:8,23
64:6
114:13,
15,18
126:16

**broad-band**
63:12,20
64:5
114:4

**broad-spectrum**
32:6
113:18
114:1,10

**broader**
53:9

**Bruce**
124:19

**build**
24:14

**built**
57:18

**bulb**
50:19
51:1
114:25
115:3,8,
16

**bunch**
6:4 28:14
42:6
56:17
92:18
120:4



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

**burn**
76:3

**business**
121:20

**butchered**
65:15

**buy**
57:17
119:9

**buyer**
57:4

**C**

**calculations**
79:14
95:19

**call**
16:5
17:9,18
20:4
23:14
57:11
64:18
72:5
98:25
107:24

**called**
4:17
12:15
45:20
57:3 79:3
115:3
119:17

**calls**
22:21
28:22
29:10

**capabilities**
75:8

**capable**
61:12

**captured**
6:22

**career**
18:16

**careful**
104:12

**carry**
128:20

**case**
7:21 12:5
24:9 27:9
67:4

**cases**
24:1
111:13

**catch**
11:23

**caveat**
20:14
21:4
112:20

**CCE**
57:12

**CCX**
57:12

**CCY**
57:12

**certified**
50:19

**CFL**
122:3

**challenge**
66:21

**challenges**
92:5

**challenging**
20:21
128:21

**chance**
16:13
124:8

**change**
44:24
80:18
129:14
130:18

**changed**
129:12,24
130:5,10

**characteristics**
56:13
75:23
78:3

**Characterization**
33:24
34:21
35:4 67:8
74:24
79:17
86:18
90:14
91:13
98:9

**characterize**
93:16

**chart**
78:3,4

**charts**
76:19

**check**
92:22

**choose**
86:22

**chromaticity**
56:24,25
57:11,12

**circle**
70:11

**circuit**
37:7
45:10
96:25
103:19
108:20

**circuitry**
49:23
50:18
108:19

**circular**
70:9,24

**circulate**
97:11

**circumference**
70:10

**cite**
71:18

**cited**
11:1
58:12
60:16
71:17
73:19
75:21
82:4
94:25
106:16,17

**cites**
105:15

**clad**
103:18

**cladding**
103:19

**claim**
23:4
31:24
32:4,11,25 35:7
36:9,13
38:7,15,18 39:25
40:9,13,16 41:5
42:23
45:21
49:19,25
66:6
69:7,10,11 70:5
78:18,20,22,24
86:21,24
88:5
97:21,22
98:6,11,13,24
99:2,5,8,9 103:25
106:18
107:22
108:3,6,11,12,16,18,23,25
109:3,6,13 111:16
114:5,11,13 126:20
127:3
130:24
131:1,9

**claimed**
48:6,23

**claiming**
109:14
120:21
122:9

**claims**
9:14
28:14
29:5
31:11
39:21
40:3 41:2



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

43:1,3 82:5 86:25 87:7,10, 17,23 88:21 90:8 97:8 101:19 114:2 121:24 122:10

**clarify**
24:22 57:22 106:20 107:3 119:6

**class-action**
5:12,13

**clear**
6:7,8 9:2 40:16,22 51:13,14, 21,23 52:3,9 53:4,9, 10,13,16, 17,19 54:2 62:6 74:16 127:15, 18,19

**cleared**
122:21

**Closed**
36:2

**closely**
43:15 44:6

**Clothing**
12:19 15:12

**coached**
24:2

**code**
57:5,8,9

**codes**
56:22

**colleagues**
12:4

**collectively**
15:16

**color**
14:13 20:18,19, 25 27:8 56:25 57:6,13, 15 58:25 59:2 72:6 76:18 86:3 112:10 116:13 118:20 121:2,5, 10 128:23 132:1,2

**colors**
113:6,7 114:16,20 132:3

**Colt**
12:18,19, 23,25 13:2,5, 15,23 15:4,9, 12,15 16:2,24 26:13,15, 18 124:1 125:16,17

**Colt's**
15:23 16:18

**column**
33:1 52:1 81:5 88:8 92:15 93:5,6, 19,22,23 95:1 99:16,17 100:10 101:3 102:8,22 103:5,13 104:13 105:16 108:4 112:3,5, 6,9,18 113:2,16 114:23 115:21 117:16 118:1 127:11 128:7 129:5,8, 11 130:8, 17 131:17,20

**columns**
58:4

**combination**
23:5 59:16 74:7

**combined**
45:13 48:13 96:13

**commercial**
14:12 15:23 16:6 19:14,23, 24 20:13, 17 21:2,7 24:19 27:3,7 32:7 51:1,24 55:12 65:1,4 66:21 109:14,22 111:7 114:14 116:1,14 118:21 126:13

**commercialized**
19:22

**committee**
21:19 126:12

**commonly**
22:9

**communications**
28:5,6

**compact**
122:3

**companies**
12:22 15:11,16 122:9,21

**company**
12:15 68:14 115:8 122:16

**compensation**
26:2,7

**compete**
121:14

**complete**
37:9

**comprising**
32:17 33:8,11, 21 34:4, 12,18 35:3,8,10 38:2 108:12,15 111:19

**conceivably**
38:14

**concluded**
7:19 132:6

**conclusion**
22:22 24:7 28:22 29:11 35:21 40:20 41:8 42:21 44:24 52:6,13 80:16,18 87:12 127:21, 22,23

**conclusions**
129:25

**conditions**
49:8 78:14 80:1

**conducting**
106:8

**conduction**
102:12

**confidence**
89:20



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

90:21

**confident**
90:16

**configured**
32:5
108:13

**confirm**
114:6

**conflating**
68:20

**confused**
37:20
60:13
77:11,16

**confusing**
60:6
106:6

**confusion**
60:12

**congratulations**
21:17

**connection**
4:14 5:6, 23

**considerably**
55:9

**consideration**
55:11
126:25

**considerations**
69:1

**considered**
36:20
55:10
94:12,13
95:13
96:10,11
106:4
132:3

**consisting**
35:19,23
36:1

**constructed**
81:10
104:20
127:17

**consumers**
122:4

**contact**
97:5

**contacting**
102:19

**content**
11:10
31:23

**contents**
24:12

**context**
22:9,20
24:5
35:11
52:19,21
107:11
114:11,13

**contingent**
26:8

**continue**
39:16
121:18

**continues**
52:19

**Continuing**
74:5

**continuum**
64:14
111:10

**contributions**
91:23

**conversion**
82:8

**convert**
113:17

**cool**
131:25
132:3

**cooling**
107:5

**copies**
8:14,17

**copy**
14:4,23
32:21,22
36:22,23
46:16
55:19
60:9
67:17
81:4 92:9
127:7
128:6

**copyright**
56:2
74:12,15

**cords**
56:14

**correct**
5:2,11
10:19,20
12:11,16, 19 13:13, 23 15:6
17:7,13, 20,25
18:4,8, 24,25
23:12
25:10
26:11,12, 14 27:4
28:17
32:8,11, 23 33:5, 18,22,25
34:1
35:17
36:2,6
38:7,12, 16 39:19, 23 40:4, 11,15,22, 23 41:6, 10 42:8, 12 44:7
46:2,5, 10,16,19
47:7,11, 15,19
48:8,23
52:4,11, 14,16
53:18
58:18
59:8,25
60:20
61:8,13, 24 62:16
65:5,22
67:25
69:1,2, 16,19,20, 24,25
75:18
77:6
79:8,12, 16 80:2, 4,9,19,24
81:13
82:17,23
83:1
84:1,19, 21 85:16
86:6
87:11,15
89:23,25
92:13,14, 19 94:2
96:19
98:18,23
99:3,7, 11,14
101:22
102:12, 16,24
103:11
104:5,22
105:21
106:12
108:6,18
111:22,23
112:1,14, 15 113:20
115:14, 22,25
117:23
118:10,12
124:2

**correctly**
63:25
95:11

**corrugation**
107:13, 17,18

**cost**
63:21

**cough**
67:13

**count**
18:25

**counts**
38:21

**couple**
123:16

**courses**
44:3,5

**court**
6:9 7:23
23:15
30:21



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

**cover**
29:15
48:11,17
49:21
50:9,16, 24 51:21, 22,23
52:15
53:10,16, 17,19,21
55:4
69:9,22
70:1,8
79:12,15, 21 83:8, 18,22
86:16
87:18
91:3,6
95:5
96:24
97:14
98:1,20, 23 99:24
100:18
101:12,17
102:13, 18,20
103:25

**covering**
50:11
69:23

**covers**
50:23
53:13
70:1

**create**
66:6 86:2
113:5

**creates**
98:20

**creating**
66:24

**Cree**
55:23
56:7
57:17,23
60:17
65:12,17, 22 73:15, 19,20,24
74:16
75:3 77:8
110:8

**Cree's**
77:25

**CRI**
14:14
48:11,20
49:23
59:13
62:15,19
63:8,22
64:23,25
65:5
116:3,6
120:18,21

**criteria**
92:7

**cross-examination**
4:5 7:17, 20

**cross-sectional**
99:18

**Csernecky**
66:13
67:6
124:4,8

**Csernecky's**
67:18,23
68:6

**current**
54:14,23
55:14,16
91:18,20
125:11,18
128:20,21

**curve**
58:24
59:1,3

**customer**
111:10, 11,14

**CV**
5:1 13:8, 9 17:12, 15,18,19
43:24

**cylinder**
70:24

**cylinders**
70:19

**cylindrical**
70:11
99:21
100:4
101:5,9

**D**

**d/b/a**
12:19

**dash**
84:12

**data**
42:3
55:24
65:17
74:17
77:21

**date**
41:18,22
43:3,5
74:12
77:18

**David**
11:9
29:12
108:1
123:8

**daylight**
81:11
82:2
112:14

**Declarant**
48:3

**declarants**
123:22

**declaration**
10:1,3,25
11:2,11, 17 13:4
14:4,20
15:5 17:1
25:5,8, 12,17,22, 25 26:21
27:12
28:8
29:21
30:8
31:8,25
33:12,22
36:19
37:23
39:17
40:8
41:12,18
43:8
45:19,23
46:19,21
47:22
49:13
50:7 55:6
58:15
59:20
60:7,14
61:22
66:12,19, 20 67:6, 18,24
68:7,22
78:12
79:24
89:13
90:25
91:25
93:11
94:8,9, 11,16
95:4,20, 21 96:3
106:2
110:7
122:25
124:5,11, 14,18,22
129:20,24
130:5,10, 19

**declaration ,"or**
10:3

**declarations**
6:5 8:14
9:9,12
10:18
13:1
123:17,25
125:10, 11,16,18
126:2,19
127:1
128:2

**deduction**
79:5

**defective**
80:3

**defined**
68:4

**definition**
38:2
43:12
44:23



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

**degradation**
76:20

**degrade**
76:20

**degree**
18:3
43:15,19
44:2,4
77:2,9
78:6
101:15
104:16

**degrees**
75:10,17,24 76:24
77:2
104:4,8,22,24,25
110:19

**delay**
30:15

**demanding**
27:8 67:3

**demands**
21:2

**Department**
120:15
122:11

**depends**
21:9

**deposed**
5:2,25
23:25

**deposition**
4:1,14
5:13
10:22
11:8 12:2
132:6

**depositions**
7:5

**derived**
60:8

**describe**
63:6

**describes**
120:4

**describing**
103:22

**description**
87:1,7

**descriptive**
19:18

**design**
44:12,20
45:4,6
67:4
68:25
73:22
75:3 76:6
77:4,8,25
85:23
88:17,19
104:15
111:15

**designed**
21:12
24:21,25

**designing**
44:15
55:11

**designs**
89:22,25

**desired**
86:3
112:10

**detail**
90:22

**detailed**
84:10

**details**
14:2

**determine**
45:20

**determined**
93:1,7

**determining**
82:20

**developed**
63:4 75:8

**developing**
20:21
50:17

**development**
93:14

**device**
38:14
45:21
65:3,13
66:6 69:5
73:2,5
101:12
102:16
105:12
109:5
117:25
118:14

**devices**
19:9
65:21
104:9
126:12

**diagram**
56:25
57:11
58:23

**Dialight**
115:3,7,8
117:25
119:3

**diameter**
20:5
70:10
81:10
84:1
103:17
128:10

**difference**
57:7
116:22,25

**Differentiation**
40:1

**difficult**
59:15
63:5

**diffraction**
53:12

**diffuse**
52:20
53:2,5
127:18,24

**diffused**
51:22

**diffuser**
50:11
51:11,12,20 52:4,10 53:1,4
100:3,4,5,14,17,18 101:8,9,10

**diffusing**
51:4,19
53:10,20
127:16,19

**diffusion**
48:10,16
49:21
50:9,16,23,24
52:15
54:6
79:12,15,21 91:3,6
101:17

**digital**
36:22,23

**dimensions**
37:18
89:3

**direct**
127:6,10
128:5
129:17
131:1,16

**directing**
131:20

**directly**
14:7

**disclosed**
103:11
105:12

**discloses**
96:4

**disclosure**
65:11
94:14
106:9

**discuss**
95:6
97:25
106:2
123:13

**discussed**
91:24
101:24
104:18
111:18

**discussing**
88:7
94:21

**discussion**
101:3
129:5

**discussions**
11:9



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

**dismiss**
121:12

**dismissed**
121:19

**disregard**
104:10

**dissipate**
89:8

**dissipating**
92:19
94:2
95:9,14
102:1,4,23
103:21,24
111:25

**dissipation**
89:25
90:12
94:1
95:8,23,24 97:18
101:22
102:2,5,7,10
104:3

**distribution**
20:18

**Doctrine**
39:25

**document**
8:25 9:1
10:14
11:5
46:13
47:3 56:3
58:12
60:17,22,24 74:16
75:5
128:1

**documents**
11:1,4
25:16
46:1 56:6
63:6

**DOE**
122:14

**dots**
51:2

**double**
117:21

**doubled**
118:5,23

**draft**
25:17

**drive**
55:7,13

**driven**
54:13,22

**driver**
48:11,17
108:20

**droop**
50:7
91:18,20

**drop**
55:9

**Ducharme**
28:17
47:5,6
105:1,5,7,12
106:10,16
129:18,20,23

**due**
9:14 48:3
50:10
66:4

**duly**
4:4

**Durosite**
115:4,9

**E**

**e.g**
74:1

**e.g.**
72:19
82:15

**earlier**
87:16
96:8
111:18
125:23
130:23

**earliest**
42:7

**easily**
84:5

**editing**
25:20

**education**
17:19
18:9

**EE**
44:4,5,8,9

**effect**
23:9 31:5
80:8

**effective**
107:10

**efficacy**
20:20
50:5
55:1,2
63:14
128:24

**eighth**
20:8
82:25
83:3

**electrical**
43:15,20
44:3
45:1,9,10

**electronic**
37:5

**element**
109:13
131:2,4

**elements**
23:3 36:9
48:6
49:19
86:21
126:21
127:3
131:9

**elevated**
50:6

**ellipse**
57:15,16

**ellipses**
49:21
57:10

**elliptical**
57:14

**elongated**
37:15
69:22

**emails**
28:1

**embodiment**
99:19
104:14
105:23
129:4,19,23 130:4,8,17

**emerge**
94:25

**emission**
64:1

**emit**
113:6

**emitters**
39:22
40:4,10,18 41:3,6

**emphasize**
20:14

**employed**
21:20

**employees**
16:20,23
121:13

**enable**
88:23

**enablement**
24:4,9,12

**enables**
89:7

**enabling**
24:13

**enclosed**
69:5
70:12
71:2
97:14
98:18

**encloses**
100:1

**enclosure**
98:21
101:18

**encompasses**
27:10

**ends**
37:14
69:15



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

70:2

**energy**
50:19
120:16
122:11

**engineer**
45:11

**engineering**
18:4,7
43:15,20
44:2,3

**engineering /design**
45:1,9

**entertaining**
44:12

**entertainment**
44:13,15, 17,18

**entire**
94:24
126:16

**entirety**
31:18

**environment**
72:16

**Environmental**
120:15

**EPA**
122:11,14

**equal**
103:16

**equipment**
79:25

**equivalent**
44:9
100:18
114:8
118:24
119:1,3

**estimated**
85:18

**ETL**
115:19

**evaluating**
111:2

**exact**
21:5

**EXAMINATION**
125:7

**examine**
85:12

**examined**
54:3
79:16

**examples**
85:17
86:3

**exceed**
86:12

**exceeding**
110:19

**excess**
59:3,5

**exchanged**
28:1

**excuse**
12:11
33:21
46:7
53:16
104:13
115:8

**exhibit**
8:19,21, 23,24
9:21 10:4
12:8,14
13:10,21
14:19
17:2
18:13
25:6
32:20
41:25
46:15,18, 22,24
47:5,6, 10,13,14, 17,19
51:25
55:19,22
60:2,10, 11 67:18
71:6,8,15
75:20
77:12
78:12
79:2
92:12
94:25
105:4
125:12,18
126:2,19
127:2,7
128:2,6
129:1,18, 24 130:6, 9,11,20
131:18,21

**exhibits**
71:12
119:12, 13,16

**exist**
62:19
64:15

**existed**
56:8
67:25

**expect**
58:7 78:8
120:25

**expectation**
22:8 66:5

**experience**
13:12,20, 22 18:10, 23 23:21, 24 27:2,3
28:12
30:4
44:12,14, 25 45:3, 6,14,16
93:13
125:22

**experienced**
121:4

**experiment**
93:11,15
96:23
99:14

**experimentally**
93:2,7

**experimentation**
89:21

**expert**
13:12,19, 22 15:5
89:5
121:3

**expertise**
68:7

**explain**
38:24
50:15
56:18
66:18
75:4
81:25
91:5 92:2

**explained**
6:25 7:15
66:20
86:20
102:3

**explanation**
95:20

**explicitly**
34:25
132:2

**expressed**
130:2,19

**expressly**
52:9
129:10,22

**extend**
107:22

**extending**
69:22

**extent**
28:21
55:18
63:9

**external**
100:24

**extremely**
64:5

**eye**
50:25

**F**

**facetious**
76:5

**facetiousness**
76:8

**fact**
20:20
44:18



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

63:3
116:10

**factor**
32:7
70:8,15,
16,22,23
80:12
82:8
98:16
107:6,19
115:1
131:5,6,
11,13

**failed**
48:12
79:7,24

**fails**
79:12

**failure**
45:20
48:4

**Fair**
16:19
73:6

**fairly**
126:15

**familiar**
12:21,23,
24,25
13:3
15:3,8
16:15,17
56:6
115:7
122:16

**familiarize**
81:15

**family**
26:17
55:24

**fan**
111:21

**fans**
130:25
131:9

**far-right**
56:21

**fast**
78:5

**favor**
75:7 77:7

**February**
119:22

**Fernando**
124:15,16

**field**
43:16
44:6

**figure**
81:12
92:21
93:12
94:19
96:3
99:18
100:3,15
101:2,8,
13,16,19,
20,21
102:16
105:7,9,
11,19
106:11
107:11
129:4,10,
19 130:2,
4,8,18

**figured**
71:12

**Figures**
100:9
101:16

**figuring**
110:16

**filed**
42:7,11

**filing**
43:5

**fill**
64:9

**film**
5:23
21:12
45:1,4
78:13

**filter**
61:13,15,
17 78:23,
25

**filters**
61:7

**financial**
26:13

**find**
30:14
59:15
60:3,4,22
94:10,15
96:18

**finding**
30:21

**findings**
26:8,9

**fine**
17:11
25:20
37:24
60:18
61:1
70:14
88:15
105:10

**finish**
107:1

**finished**
81:7
92:16
93:20
106:24

**fins**
111:25
130:25
131:9

**firm**
4:10

**first-hand**
56:7

**Fischer**
124:24,25

**fit**
82:21

**five-ish**
81:1

**fixture**
105:19

**flickering**
122:5

**florescent**
70:17
83:15
101:1
122:3

**fluorescent**
19:8
32:8,9
70:9,19
100:22,
23,24
103:17
114:25
115:2
131:5,6,
10,13

**flux**
56:13
57:2,24
58:3,5
76:11
117:10

**focusing**
36:9

**follow**
74:21

**foot**
81:9
83:25
84:18
85:1,3,4,
10 115:17
120:1

**foot-candle**
82:3

**foot-candles**
82:9

**forgot**
45:22

**form**
25:16
29:13,14,
23 32:7,
18 33:13,
23 34:6,
20 35:5
36:15,18
37:15
39:2,12
40:5,7,
12,19
41:7
42:16,24
43:6 48:5
52:5,12,
17 53:7
54:20
57:20
61:14
65:14
69:6
70:6,8,
15,16,22,



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

23 73:9,
11 74:8,
23 79:18
85:21
87:4,13
89:2,14
91:19
96:15
98:10,16
99:4
113:7
114:12,25
115:1,16
125:13
129:13
131:5,6,
10,13

**format**
119:9

**formation**
66:23

**forward**
78:5
123:4

**found**
56:9
60:12
63:6
112:12

**four-step**
57:8,16

**frame**
62:24

**Frank**
131:2

**Fred**
46:18

**freely**
97:11

**frequently**
112:10

**front**
9:3 12:7,
10,13,14
41:24
42:5
60:10
69:9
111:17
127:8

**full**
98:21

**fully**
69:5

**function**
97:1

**functionality**
89:4

**G**

**G/m**
48:11,20
49:22
58:17
59:11
61:13
78:13
92:1,6

**G4**
57:3

**gaffer**
25:2

**Gary**
4:1,3
10:8 17:5
25:8

**GE**
18:16
19:22
21:20
50:20
63:4
121:13
122:7
125:22
126:11

**gel**
78:15,23,
25

**general**
14:10

**generally**
70:23
73:12

**gentleman**
124:19

**Germany**
50:22

**give**
8:13
35:12
49:16
53:11
55:19
71:9,12
89:20
92:9 96:2
119:12

**giving**
105:4

**goal**
104:2,7

**good**
4:7,8 7:8
19:11
44:6
65:24
85:24
88:17,19,
24 93:5
95:2
107:7
112:7
114:21
122:23

**grab**
9:23 81:4

**grabbed**
118:5,8

**grabbing**
67:17

**graduated**
18:3,6

**graphics**
63:5,6

**grating**
53:12

**great**
17:5,12
37:6
121:20

**greater**
48:12,20
49:23
59:14
62:15,19
70:12
104:8
116:6

**green**
14:15
58:22
59:4
113:6
116:3,7,
12 119:25

**Greenbergtraurig**
4:10

**ground**
6:2 28:13
29:4

**group**
57:2
125:23

**guess**
10:13
50:9

**guessing**
35:23

**guest**
112:21

**guidance**
77:24
89:19
90:23

**guide**
75:3
77:4,8,25

**guideline**
87:14

**guidelines**
90:2

**Guillermo**
27:17

**guys**
51:7
80:21
123:13

**H**

**H2**
57:3

**half**
5:17 21:8
57:16
84:1

**hand**
58:23
71:15

**hands**
121:4

**happen**
13:7



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

**happened**
75:6

**happy**
95:25

**Harassing**
34:21

**harder**
55:7,13

**Hasnain**
11:4
45:20
47:17,18
54:24
55:7,9
64:22
65:3,9,20
75:13
79:7,11,
24 80:11
83:12
92:10,12,
13,18,22,
25 93:25
95:5,6,7
96:4,12
97:20,22,
24
101:11,
18,21
102:23
103:11
104:12
128:25
129:3,11,
15,16
130:9,18

**Hasnain's**
48:4 49:6
65:10,12
96:23
99:13
101:15
104:9
129:4

**head**
6:17,21

**header**
45:20
62:16

**heading**
68:24
79:3,11
80:7

**headings**
56:19

**hear**
71:13

**heard**
7:24

**heat**
66:24
72:19
74:1,2,6,
9 79:25
88:11
89:4,8
90:12
92:19
94:1,2
95:6,8,9,
14,23,24
97:2,9,
16,18
100:25
101:21
102:2,4,
6,10,11,
23
103:11,
21,24
104:3
107:7,20
111:25

**heat-conducting**
103:6

**heat-dissipating**
103:15

**heat-radiating**
103:20

**Heath**
4:9

**held**
104:16

**high**
14:14
20:19
63:8
64:25
65:5
66:21
75:24
89:20
90:19,21
92:6
128:19

**higher**
54:14,23
57:3
72:16,25
73:3,7
74:20
75:2,10,
12 76:23
128:22

**highest**
73:20

**highly**
50:20

**Hoffman**
6:24
7:14,20
8:18
11:10
12:2 13:2
14:25
15:1
22:21
24:6
25:13,18
28:21
29:2,10,
14,23
30:17
32:18
33:13,23
34:5,20
35:4,21
36:14,17
39:2,7,12
40:5,7,
12,19
41:7
42:16,24
43:6
52:5,12,
17 53:7
54:17,20
57:20
59:18
61:14
65:14
67:8 69:6
70:6
73:9,11
74:8,23
77:13
79:17
80:24
82:12
85:21
86:17
87:3,12
89:2,14,
24 90:1,
14 91:8,
13,15,19
92:3
93:21
96:15
98:9 99:4
108:2
109:10,25
114:12
119:17
123:3,9,
17 125:3,
8 130:13
132:4

**hold**
11:22

**Holmes**
45:20
46:18,21
55:9
68:24
79:7,11,
20,24
80:4,11
97:20
101:14

**Holmes'**
11:16
48:4
79:14

**home**
121:20

**honors**
44:4

**horrible**
121:5

**hot**
97:10
104:25

**hotter**
67:1
76:16,17
97:15

**hour**
81:1 88:7
89:19
104:18
110:15,20
111:1

**hours**
85:18,22



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

90:11
91:11
109:19,23
110:12,22
111:12,14

**housing**
37:8,14,
17 69:8,
15,18
70:2,7
88:22,23
89:1,5,7,
10,20
90:9,11,
20 91:6,
12 97:14
98:7,14
99:3,6,11
103:25

**huge**
55:6

**humming**
122:5

**hungry**
108:1

**hybrid**
20:19

I

**Iamiro**
28:17
47:13,14

**ideal**
49:8

**identical**
9:13

**identifying**
56:20,22,
24

**II**
66:3

**illuminates**
117:13

**illuminating**
117:6

**image**
14:12
15:23
16:6
19:14,23
20:13,17
21:2,7
24:19
32:7
51:24
65:1,4
66:21
109:14,23
114:14
116:1,14
118:21
126:13

**imagine**
53:9

**imaging**
27:3,7
51:1
55:12
111:7

**impact**
72:18
73:1,4
96:13

**important**
6:10

**impression**
107:8

**improperly**
86:7

**improved**
72:19
74:1

**inadequacy**
96:22

**inadequate**
95:24

**inappropriate**
49:7,9

**inch**
20:8
82:15,16
83:1,3
84:1

**inches**
20:7

**include**
13:14
22:17
35:16
83:22

**included**
13:20
37:22
38:7

**includes**
27:5
32:13,16
33:12,17,
20,22
34:4,12,
17,18
35:3,15
36:5
38:1,2
44:3
100:14
109:23

**including**
37:14
48:10
49:20
69:15
108:20
126:21

**inclusive**
35:25

**incomplete**
49:11
80:5,6

**inconsequential**
130:3

**inconsistencies**
14:18
125:21

**inconsistency**
14:22
84:11

**inconsistent**
125:11,17

**incorrect**
85:6,14
104:11,17

**increase**
55:16
104:21
107:19,20

**increased**
80:8,12

**increment**
104:24

**Incrementally**
104:23

**indication**
73:15
90:4

**indirectly**
111:4

**individual**
50:12
86:22
113:5

**indoor**
72:15

**industry**
20:11
45:15
54:4
112:11
121:24
122:2,3

**ineffective**
103:2
107:5,14

**inefficient**
20:23

**infer**
119:5

**inference**
109:8,11,
12

**inferring**
118:24
119:1,2

**infers**
70:11
109:17

**informed**
71:1

**infrared**
63:13,18,
20

**infringement**
24:1

**inherent**
49:20

**inherently**
50:5

**inserted**
60:14



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

**inside**
97:15
102:17,20

**insignificant**
93:16
110:21

**instance**
38:9
65:12
88:21
92:21
94:17
111:25
117:5
124:4,7

**institutions**
121:24

**instructs**
7:1

**insufficient**
75:14
95:21
110:18

**insufficiently**
95:11,12

**intensity**
57:6
116:18

**Inter**
4:14,17,
22 46:9

**interchanged**
103:23

**interest**
26:11,13

**International**
12:18
15:12

**internet**
120:8

**interpret**
35:25
70:24
83:13,16
84:22,24
85:3
86:14,19

**interpretation**
35:13
83:19,20
84:7 98:6

**interpreted**
87:10

**interrupt**
6:11,13
98:5

**interrupting**
78:3

**invented**
19:22

**invention**
20:23
23:10
31:6
41:19
43:3,9
54:1,5
68:12
75:1 88:3
99:20
103:14
104:14
116:11
126:9

**inventions**
93:14

**inventor**
53:8
83:20
86:8,20
90:4,17
128:18

**IP**
13:2
14:16
126:16

**IPR**
4:21 9:2,
4,10
23:17
46:1
125:19
126:20
127:2
128:3
130:20

**IPR2023-00613**
4:25
8:15,20

**IPR2023-00614**
4:25 8:15

**IPRS**
4:18
123:23

**issue**
31:11
61:20

**issued**
27:17

**issues**
11:11
25:14
66:4
81:22
89:12
90:20
91:6 92:2

**items**
49:25

**iteratively**
25:13,18

**J**

**job**
19:11
51:18

**junction**
72:17
73:8,14,
16 75:9,
11,17,23
77:20,22,
25 78:6,
13 79:4

**junk**
120:12,17

**K**

**Katzir**
28:17
47:9

**Ken**
124:23

**Kevin**
124:11,12

**key**
80:12

**kind**
101:18
107:18
122:12

**Kit**
28:17
46:24
47:2

**knew**
56:8 65:3

**knowledge**
60:20
61:4
125:10

**L**

**lab**
55:8 70:9

**label**
93:13

**labeling**
122:13

**laboratory**
97:12
102:14

**ladder**
66:23

**laid**
47:21

**lambertian**
51:20

**lamp**
19:22
20:3,22
32:8,9
45:10
81:10
83:11,14,
21 84:1
85:4,10
86:22
97:13
102:5
115:2
120:19
131:7

**lamps**
21:14
27:2,5,6



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

44:16
45:6,7
86:2,5

**language**
23:2,8
24:2,12
31:4
32:17
36:5 72:9
93:10

**laptop**
60:22

**laterally**
97:3

**law**
4:10
21:22
22:4,14,
16,20
24:5
35:11,20,
24 38:22,
24

**layer**
122:1

**layers**
25:19
99:10

**layout**
24:25
25:1

**leading**
50:17

**leave**
106:15
107:7

**LED**
5:18,20
12:19
14:16
15:12
21:8
27:2,5
32:5,13
33:8 35:7
44:20
48:11,17
49:6,7
50:17,19
56:20,23
61:12
62:25
63:2 68:8
73:3 74:2
75:23
76:19
77:19
78:6,22,
23 81:10
82:16
83:5,10,
13,14,21
84:1
85:4,10
86:2
97:2,13
98:16
102:4,20
103:14
104:2
108:12,20
113:4,18
120:1,5
121:7
122:2
126:12
128:20

**LEDLIGHT.COM**
122:17

**LEDS**
19:5,8,15
20:22
38:11,12,
15 39:22
40:4,10,
17 41:3,6
50:5,12,
24 51:10
54:13,15
55:7,17,
23 57:4,
13,17
59:10,13
62:19
64:23
65:11,21,
22 73:20
74:19
75:8
81:11
82:14,21,
25 86:3,
6,9,11,
12,16,23
88:1
90:19
92:6,18
93:2,7
97:1,9
99:22
103:15
104:4,16
105:20
110:10
113:6,19
114:25
115:17,19
116:11
117:16,
18,21
118:1,15,
17,19
120:5
128:11,
12,15,19,
20

**left**
56:20
57:1

**legal**
22:21
23:8
24:2,7,11
25:19
28:22
29:11
31:4
35:21
40:19
41:7
52:5,12
87:12,14

**length**
69:23

**lens**
99:21,25
100:4
101:5,9

**Letter**
46:9

**letters**
46:5

**letting**
37:3

**level**
13:3

**levels**
82:3

**liability**
20:19

**life**
73:4
76:18
85:17
88:7
89:19
90:4
110:20
111:8
121:9
122:5
128:22

**lifetime**
72:18
73:1
85:22
109:5,23
111:2,5

**light**
32:5,6,8,
9,13
33:8,16,
17 35:7
36:5
40:4,10,
18 41:3,6
49:8
50:12,18,
25 51:1
52:20
53:2,6,20
58:24
59:4
63:12
67:25
68:1,4,
10,14
70:9 72:6
78:22,23
81:12
87:11
99:19,21
100:13,
22,23,24
101:1
103:5,7,
14 104:20
108:12
113:5,7,
17,18
114:1,11,
19,20
115:18,25
116:18
118:10
119:2,3
120:1,5
122:3
127:19,
20,24
131:7



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

**lighted**
50:19

**lighting**
5:18,20, 22 16:5 18:16,20 19:9,15, 23 20:11 24:16,18, 21,24,25 44:13,15, 17,19 45:2,4, 14,21 48:13 54:4 63:4 68:8,10, 11 71:2 74:3 105:11 112:11,12 113:4 119:9 121:13, 20,21 122:20 126:12

**lights**
44:20 67:6 117:7,9

**limit**
48:11,20 49:22 58:18 75:17 78:13 92:1 104:3

**limitation**
37:6,13 38:10,11, 12 48:6, 10 69:14, 21 70:7 71:1 88:22 108:16

**limitations**
41:4 69:7 86:21,24 88:3 103:24

**limiting**
38:19,20, 22,25 39:10,11, 15

**limits**
49:24 74:20 75:2

**linear**
66:22 70:8,15, 16,20,21 98:16 131:6

**lines**
27:16 71:21 88:8 92:16 95:1 100:2,10 128:9 129:5,7, 8,11 130:9,17, 22 131:17, 21,23

**links**
123:3

**list**
19:2 46:4

**listed**
8:23 12:11 13:8,9 17:19 18:10 36:10 38:6 82:1

**listing**
18:22 45:25

**lists**
42:6

**LLC**
12:16 15:19,25 16:21

**LM**
76:11

**locate**
56:3,5

**location**
80:1

**long**
29:13 31:19 46:5 56:22 81:9 82:21 83:25 85:10,20 98:3,4,5 111:5,8 115:17 128:11

**long-life**
20:19 109:17

**longer**
128:22

**looked**
9:12 60:7

**lose**
51:10

**loss**
50:10,11, 16 53:18, 21,23,24 63:14 91:18

**losses**
49:20 50:23 51:15 55:4,6 58:17 62:15 92:1

**lot**
22:7 27:1 104:11

**lots**
89:8

**loud**
54:18 78:21 114:24

**low**
14:14

**low-quality**
122:20

**lower**
50:5 57:3 75:12 105:20

**LPW**
49:6 51:9 54:25 55:8 63:20 64:23

**lumen**
14:15 45:21 48:5,13 49:20 50:10,16 53:18,23, 24 61:10 76:24 80:9 82:5 84:8 86:10 110:11

**lumens**
51:5 57:3,4 58:6 63:22 82:9 84:18,25 85:1,5 86:4,13, 15,23 87:22,24, 25 88:3 115:18,24 116:23 117:1,5,8 119:10 120:6,18, 23,24 121:8,15, 16,17

**luminaire**
48:6,13 72:14 75:3 77:4 78:14 86:11 92:8

**luminaires**
27:5

**luminosity**
82:1,5 84:6,20 86:6

**lunch**



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

80:22,25
107:23
123:10,
11,14

**lux**
82:3
116:19,
22,23,25
117:5,13

**M**

**Macadam**
49:21
57:10

**Machine**
119:17,23

**Macias**
27:17,20
88:25
89:9 91:5
92:1
109:19
110:4
117:15
118:5

**made**
79:21
115:3

**magenta**
58:22
59:1,5
116:3

**magnitude**
107:6

**maintains**
57:23

**maintenance**
110:11

**majority**
9:15,21
18:15

**make**
40:21,22
65:12
79:20
111:17
112:23
122:8
123:4

**makes**
75:13

**making**
97:15
101:18
103:7

**manage**
103:10

**management**
20:24,25
37:9
68:25
88:17,19,
24 89:12
91:22
97:23
98:1,7
106:17
107:7,8,
10 128:16
130:2

**manner**
103:10

**manufacture r**
120:13,14

**manufacture rs**
50:22
56:8

**marginal**
61:17

**marked**
119:15

**market**
50:17
120:17

**master's**
17:24
18:7

**match**
114:24

**matches**
21:2

**material**
50:21
54:4
113:17

**materials**
99:6,10

**matter**
4:12
17:16,17
51:12
97:17

**matters**
4:24
51:14

**maximum**
72:10,13,
17,25
73:7,13,
15,21
76:1,2
104:20
109:2

**meaning**
20:1 63:8
111:18

**means**
7:19
16:10
24:4,10,
23 35:10,
15,20
38:5
39:14,15
40:1,9
41:4,5
55:2
58:20
59:3,5
70:21,23
76:3
87:10
89:8
102:5
114:15,19

**meant**
22:17
87:17

**measure**
84:20
88:1

**measured**
55:8
84:25

**measurement**
101:15

**measurement s**
57:25
58:9

**measuring**
86:9

**mechanism**
53:20

**medication**
8:10,11

**medications**
8:6

**meet**
69:7 92:7
122:10

**member**
21:19

**members**
26:17

**mention**
79:20
83:8
127:15

**mentioned**
64:6
88:11
99:13
124:23
125:23
129:10,22

**mentions**
131:4

**mere**
118:7

**messages**
28:3

**met**
27:22
122:14

**metal**
103:18,19

**meter**
117:6,7

**meters**
117:8

**method**
90:18

**middle**
9:3 11:24
12:15
54:10
56:21
62:23
66:3
74:11
82:16,17
94:24
110:8

**millimeters**



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

70:13
83:3
128:10

**mind**
16:7 49:1
67:17
77:15
78:2
111:9
112:20
114:8

**mine**
67:16

**minimum**
14:24
76:8
108:17,
22,25
109:5
111:9

**minute**
29:17
45:22
56:11
76:4,5

**minutes**
7:6 36:11
66:1 81:1
88:6
105:2

**mischaracte
rization**
29:11,15

**mischaracte
rizes**
29:2

**misleading**
104:23

**misread**
74:25

**misrepresen
ting**
118:19

**missing**
84:5

**misstated**
85:2

**misusing**
103:21

**mix**
113:7

**MK-R**
55:23

**moment**
127:11
131:22

**monochromat
ic**
113:17

**morning**
4:7

**motion**
45:15

**mounted**
92:19
97:1
99:22
103:15
108:19

**move**
15:3
106:18,21

**movie**
5:23
24:16,24,
25

**moving**
61:18
100:2
102:6

**multiple**
99:10

**N**

**named**
44:10
68:14
124:19,23

**names**
115:11

**nanometer**
64:9

**nanometers**
63:10,13,
17 64:6,
10,12
114:17,18

**narrow**
37:15,18
63:7,16
64:10

**narrow-band**
62:25
63:2,19,
25

**narrower**
63:23
64:1,13

**narrowless**
63:23

**natural**
115:18,25

**nature**
26:8

**nearby**
79:25

**necessarily**
99:25
100:24
111:5,6

**needed**
63:17
111:14

**needing**
72:16

**ninety**
48:21

**NIST**
121:16

**nominally**
114:17

**non-
attorney**
39:13,14

**nonlimiting**
39:15

**nonpregnant**
39:14

**noon**
107:25

**normal**
62:10

**note**
57:23

**noted**
102:10

**nuclear**
18:3,7

**number**
9:4 42:11
56:22
57:5
86:11
92:6
110:2
111:9
118:6,23
128:19
129:1

**numbering**
61:20

**numbers**
8:23 9:15
61:23

**numerical**
95:19

**O**

**oath**
76:7

**object**
6:25 39:5

**objection**
22:21
24:6
28:21
29:14,23
32:18
33:13,23
34:5,20
35:4,21
36:14,17
39:2,12
40:5,7,
12,19
41:7
42:16,24
43:6
52:5,12,
17 53:7
54:17
57:20
61:14
65:14
67:8 69:6
70:6
73:9,11
74:8,23
77:13
79:17
85:21
86:17
87:3,12
89:2,14,
24 90:1,



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

14 91:8, 13,19 92:3 96:15 98:9 99:4 109:10,25 114:12 125:13 129:13

**objections**
29:10,13

**obvious**
28:15,16 29:6

**obviousness**
22:13,18 23:6,7, 18,22 24:3 28:19 29:9,20 30:4,7, 10,23 31:2,3,10 36:12 96:6,9 125:24 126:3

**occur**
114:1

**offer**
77:10

**office**
4:15 121:21

**officers**
16:20,23

**omit**
80:12

**omits**
68:25

**one-third**
56:20 57:1

**open**
36:2 38:3,5 99:14 101:17

**open-ended**
35:17 111:19

**operate**
76:23

**operates**
73:3

**operating**
50:5 72:16 76:4

**operation**
80:8,13 97:19 109:18

**opine**
24:8 25:14 28:13 29:3 74:22

**opined**
22:6

**opinion**
22:1 23:18 79:14 80:4 89:18 129:12,14

**opinions**
23:22 25:17 79:15 126:19 127:1 128:2 129:6,12 130:5,10, 19

**opportunity**
130:2

**opposed**
19:8 36:2 83:11

**optical**
50:10

**optimizatio n**
118:7

**order**
50:11 55:4 56:22,23 57:5,8 59:10 64:6,8 69:7 86:23 107:6 114:24

**orders**
56:14

**ordinary**
23:12 43:13

**original**
32:17

**outcome**
26:9

**output**
21:2 45:21 48:13 50:12 51:5 54:24 55:17 57:1,5 76:24 84:18,25 85:5 86:10

**outright**
122:4

**overcame**
88:25 91:5 92:2,5

**overcome**
80:9 89:12

**overdriving**
55:2

**overheated**
121:9

**overheating**
91:21,23

**overly**
110:1 112:24

**owner**
12:19 45:13

**owner's**
11:13 25:9 44:23

**P**

**p-n**
75:16

**P-O-S-I-T-A**
23:14

**p.m.**
132:6

**pages**
31:19,20

**panel**
67:25 68:1,4, 10,15

**paper**
60:9

**PAR**
19:21 20:1,2,4, 5,9 21:14 27:6 44:16 45:6,9

**parabolic**
20:1,9,10

**paragraph**
25:5,24 26:20 27:11,13 28:7 29:21 31:8 32:1 33:5,16, 18 39:19 41:11,17 44:22 45:25 47:25 48:1 49:3,5, 12,18,25 50:8 53:17 54:7 58:14 59:19,24 60:4 61:22,23, 24 62:16, 22 64:18 66:10,17 67:20



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

68:21,24
69:4
71:4,20
74:10
78:11
79:3,11,
23 80:7,
15 90:24
91:2,25
93:18
104:1
110:6
114:23
129:23

**paragraphs**
62:5

**paraphrase**
24:11

**part**
11:14,17
33:4
44:22
48:8
59:23
63:5 64:3
70:25
71:6 90:9
93:15,17
97:1
98:23,25

**Partes**
4:14,17,
22 46:9

**parties**
12:10

**parts**
21:25

**pass**
19:12

**past**
23:21,24
125:9,15

**patent**
4:9,15
5:7,9,14
9:15
11:13
12:19
21:19,22
22:4,14,
16,20
23:10
24:1,5,
13,14
25:9
27:16
31:6,11
32:5,22
33:7
35:11,20,
24 38:22,
24 41:25
42:23
44:23
45:12
46:10,12,
16,25
49:19
52:3,9
53:1 59:8
67:7 68:9
69:12
78:19
81:5 87:8
88:19
89:11
91:7 92:2
93:23
108:4
112:3
113:13,
15,24
115:13
117:15
125:17,23
126:11,
21,24
127:4
128:7
129:1,3,
18
131:17,22
132:1

**patentable**
22:2,6,10

**patents**
11:11
18:22
19:5,13,
21,25
20:2,12,
15 21:6,
8,16
25:15
125:24
126:13

**pattern**
81:12

**penalties**
14:15
48:5
61:10
80:9 89:1

**penalty**
79:21

**pending**
7:9

**Penn**
18:2,7

**percent**
51:5,7,
10,16
53:25
54:5
57:24
58:3,8
63:21
107:18
110:11

**percentage**
58:13

**performance**
76:15,18,
20 90:19
122:8,10
128:23

**peripherally**
12:24
15:18

**person**
23:11
43:13
65:20,21
124:10,
14,18,22,
23

**personally**
54:3

**perspectives**
91:10

**pertains**
112:24

**petition**
46:7,9,12

**Petitioner**
4:11
12:16
48:12

**Petitioner's**
43:12
48:3

**Ph.d**
17:22
25:9

**Ph.d.**
4:1,3
17:6

**Phillips**
122:7

**phone**
27:24

**phosphor**
63:2,9,
12,16,23,
25 64:10
113:17,19

**phosphor-based**
39:22
40:4,10,
17 41:3,6

**phosphors**
62:25
63:7,8,19
64:5

**phrase**
22:9

**physicist**
18:20

**picture**
45:15
105:11

**piece**
23:3

**place**
84:4
122:23

**placement**
104:2

**planned**
24:18

**plastics**
51:4

**plate**
100:14,17

**platform**
105:20

**plurality**
38:10,11,



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

14 103:15

**plus-minus**
57:24
58:3,8

**point**
48:11,20
49:22
55:9
57:13,15
58:18
59:2 67:2
73:6,19
75:15
79:4
88:18
90:12
92:1 94:7
95:3,5,22
108:8
126:5

**pointed**
72:4

**points**
25:20
51:18
116:6

**poor**
116:12
118:20
121:10,25
122:4

**portion**
105:14
132:1

**POSITA**
23:9,11
24:13
31:5
43:13,14
44:24
55:10
64:25
65:10,11,
20 66:4
73:22
83:15,20
84:8
86:7,14
89:6,7,
11,20
90:6,16,
21 104:7,
10,12
110:4
116:7
126:6
127:21
128:17

**position**
102:21

**possession**
90:7

**possibly**
88:20

**power**
57:18,24
58:9,11,
13 80:8,
13 108:5,
9,12,14,
17,21

**preamble**
32:11
33:5
38:19
39:10

**preclude**
111:21,24

**precludes**
130:25

**prefer**
17:9,15
80:22

**preferably**
116:18

**preferred**
53:14

**pregnant**
39:1,9,13

**preparation**
11:14,19
14:21

**prepare**
10:22
11:7 12:1
25:12

**prepared**
25:13

**preparing**
25:21
106:9

**present**
99:19
103:14
104:14

**presentation**
26:9

**pressing**
122:2

**prevent**
8:7,12

**previously**
54:16

**primary**
113:4,6

**Princeton**
17:25

**printed**
96:25
103:19

**prior**
7:4 11:1,
3,11 13:1
23:3,4,16
25:16
28:15
30:3
31:15,17
68:12
74:7,9
75:6
79:16
95:15
96:14
100:21
101:14
103:7
106:4
110:16,18
111:2
117:22,24
118:14
125:24
126:3

**privileged**
123:5

**problem**
62:8 98:1
116:10

**problematic**
121:25

**problems**
90:5,6
97:22

**proceeding**
13:5,7
14:7
26:10,11
46:1

**proceedings**
4:15 5:7,
9 6:6
9:10,21
15:6
125:19
126:20
127:2

**process**
30:12

**product**
55:24
67:2
116:13
120:5
123:6

**production**
5:23
21:13

**products**
15:22,23
16:1,4,7,
10,12,14,
15,16,18
27:9
116:15
122:6

**proper**
23:2
60:22

**properly**
117:3

**proposed**
43:12

**prosecution**
125:17

**Protection**
120:15

**provide**
6:8 14:2
16:1
50:22
54:6 64:8
82:6 86:4
87:7
104:3
107:5,18,
21 108:13
110:11

**provided**
14:5
23:16,18
24:2



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

42:22
60:24
74:9
78:23
90:2
116:12

**providing**
6:12
15:22
32:6,21
63:11
75:14
86:5
90:19
92:5
114:19
126:2

**provisional**
42:10,14, 22,25
43:2,4

**pull**
30:1

**purchase**
57:6
65:11,21, 22

**pure**
59:6

**purposes**
84:14
120:9
129:20

**pushed**
51:6

**put**
9:22 13:4
15:4 23:9
31:5
64:14
86:10
87:23
109:19
116:14
121:7
122:6

**puts**
117:7

**putting**
122:11

**Q**

**qualify**
106:16

**quality**
14:13
19:15
20:18,25
67:3
118:20
121:2,5, 10,25
122:4

**quantify**
55:5

**quarter**
82:15,16

**Quasar**
4:11
12:15,24
15:19,25
16:14,16, 21

**question**
6:7,14
7:2,10
11:21,24
12:12
21:9
24:10
29:1,22
30:11
31:1
33:14,15
34:8,13, 19,22,24
37:12
39:5,6
40:25
52:7
57:21
62:23
85:6 90:2
94:11
107:3
109:21
110:25
111:1
126:24
130:15,16

**questions**
6:5 27:14
28:13
29:4
30:23
56:10
106:23
123:1,18, 21 125:2

**quick**
9:1 37:1
128:10

**quote**
110:8

**quoted**
75:2

**quotes**
33:25
34:1,2
35:6

**quoting**
83:2

**R**

**raise**
73:15
75:15

**raised**
72:18
73:14

**ran**
121:12

**range**
57:14
126:16

**ranges**
84:11
86:3
112:11

**rate**
54:23

**rated**
54:14
110:10

**reach**
127:21,23

**read**
25:15,25
26:3,4,5, 23 27:12
28:7,25
29:1
30:16,22, 25 31:15, 17,20
32:4
37:13
41:14
42:17
47:23
49:3,14
50:13
52:22,23
54:8,18
58:14
67:20
71:5
74:11
78:21
81:6
83:23
92:15
93:1,18
98:24
99:16
100:10
105:9,16
106:3
112:4
113:2
114:5,24
115:21
124:6
126:20
127:2,12
128:9
130:13,15
131:22

**reading**
70:14,15
112:5
121:18
128:17

**ready**
26:1,24
28:9
41:15
47:24
54:8,11
58:15
59:21
62:13
64:20
67:21
68:22
71:7 72:2
105:17

**real**
9:1 37:1
121:4
128:9

**realities**
55:10

**reask**
21:11



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

130:16

**reason**
8:3 60:13
64:7
73:19
93:10
130:1

**reasonable**
22:8 66:5

**reasons**
28:11
103:4

**recall**
5:15
11:15
14:9,17
23:25
30:2,3
37:10
67:5,9
81:17
88:20
117:15
126:14

**received**
46:1

**recently**
5:16

**recess**
29:18
30:19
37:2 81:2
123:10
125:6

**recite**
39:21

**recited**
41:4
49:19,25
70:4 88:8
108:6,17

**recites**
32:5

**recognition**
118:4

**record**
4:24 7:1
10:2
23:11
29:16,19
30:1,14,
18,20,23,
25 35:1
36:24
37:1
40:16,21
62:5 81:3
123:7,9

**recording**
14:12
15:24
16:6
19:15,23
20:13,17
21:3
24:19
27:3,7
32:7
51:2,24
55:12
65:1,4
66:22
109:15,23
111:7
114:15
116:2,14,
15 118:21
126:13

**recordings**
21:7

**recross**
132:5

**red**
59:1,6
63:7,8,
11,16,19
64:5,8,10
113:6
114:18

**redirect**
125:5,7

**reduced**
50:23

**reducing**
48:5

**reexam**
13:15
14:2
122:24

**reexaminati on**
13:5,23
14:10,18,
24 15:5
123:17

**reexaminati ons**
125:16

**reexams**
13:2

**refer**
50:6
51:19
57:10
58:4,24
62:4

**reference**
31:17
48:4 96:9
105:5

**references**
28:15
73:20

**referred**
17:15
56:24
113:19

**referring**
4:22 10:4
11:5
15:16
46:13,22
47:3,6,
10,14,18
58:9,13,
21 62:10
93:12
97:4

**refers**
58:22
60:2
112:22
117:13

**reflector**
20:1,10

**regard**
68:7
99:12
114:15

**region**
56:24

**regulations**
122:12

**rejected**
122:4

**relate**
20:12
21:6

**related**
5:9,15,
18,20,22
19:8,13,
21,25
20:2,16
21:8,10
24:1
25:16
28:13
29:4 42:2
43:16
44:6 72:9
76:19

**relates**
14:7

**relation**
16:10
19:5

**relative**
59:6
63:22
101:19

**Relevance**
24:6

**relevant**
35:22

**reliability**
21:1 27:9
67:3

**reliable**
120:14

**relied**
55:20
66:12,18

**rely**
23:21
68:6

**relying**
23:4

**remark**
88:16

**remember**
88:13
91:22
114:3

**repeat**
28:24
34:23
52:8
65:16
92:4 96:7
125:14



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

130:12

**rephrase**
99:5

**replace**
32:16
34:3,17
79:19

**replaced**
33:20,21
34:11
35:2
100:4
101:8

**replacement**
83:14
103:14
104:19

**report**
42:15
92:13
103:1
106:9

**reporter**
6:9 7:23
23:15
30:21
130:13

**represent**
4:11

**represented**
114:16

**reproduce**
24:14
90:22

**reproduced**
89:21

**require**
21:1
40:3,9,17
41:2,5
70:15
78:24
79:1
122:13

**required**
7:2,24
63:11
88:24
94:1
95:8,23
96:5
110:2

**requirement**
44:11
45:12
69:5
104:15
108:15,25
110:15
111:2

**requirements**
14:14,15
20:18
27:8
44:17
48:22
57:18
108:5,10
116:4

**requires**
103:25
111:7

**research**
18:19

**residential**
119:9
120:9
121:1,2,6

**resolved**
91:21

**respect**
126:24
127:14

**response**
11:14
25:9

**responsible**
45:11
126:15

**rest**
48:7
94:20

**restricting**
112:24

**restroom**
36:25

**result**
61:10
90:22

**resulting**
48:5

**results**
24:14
49:6
89:17,21
90:13

**resume**
17:12,16

**retained**
28:12
29:3

**review**
4:14
11:12,13,16 14:20,25 23:16
40:13
42:19
46:10
59:20
95:3
100:9
122:24
125:23
126:11,12,25
129:4

**reviewed**
46:1 60:7

**reviewing**
10:25
11:10,15
128:25
129:3,20

**reviews**
4:17,22

**rid**
102:5

**right-hand**
59:24

**ring**
115:11

**rise**
101:15
104:15

**rises**
66:24

**roughly**
13:18
57:16
82:25

**round**
131:14

**row**
58:6 82:1
84:11,12

**rows**
81:10

**rules**
6:2 96:8

**run**
76:16,17

**S**

**saturates**
55:18

**Saturday**
67:16

**scale**
110:21

**scan**
36:22

**science**
4:11
12:16
15:19,25
16:21
18:4
43:15,19
44:2

**sciences**
17:23,24

**scientific**
84:14
85:13

**scope**
38:15
41:8
42:24
43:6
89:14
90:15
91:8,15
92:3
109:10,25

**Scratch**
46:8

**scrutinize**
129:15

**scrutinized**
130:21

**search**



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

37:6,21

**searching**
37:11
58:10

**section**
22:3,13,
15 45:18
58:17
66:3,9
69:4
92:25
108:19
112:4
117:7

**select**
88:1

**selected**
86:3

**selecting**
90:19
92:7

**semi-translucent**
52:10

**semi-transparent**
53:4

**send**
123:2

**sense**
102:3

**sentence**
41:17
43:10,11
50:4
52:18
62:23
67:23
81:9
85:25
102:9
127:15,17

**separate**
91:20

**set**
24:21,24,
25 45:14
78:14
79:25
112:12

**setting**
126:18
127:1

**settings**
20:20

**shade**
52:4,10
53:1,5

**shakes**
6:21

**shaking**
6:17

**shape**
89:4

**sheet**
55:24
65:18
77:21
92:22

**short**
37:7
121:9
122:5

**shorter**
76:17

**show**
36:19
76:19
101:8
106:1

**showing**
75:7

**shown**
92:21
99:17
100:3,14,
22 107:4
121:24

**side**
37:16,19
59:24
69:24

**signature**
10:6,10,
15,16

**significantly**
75:12
77:10
89:17

**silent**
99:2,5,8,
9,12

**Silva**
124:15,16

**similar**
14:16
15:23
16:1,4,18
21:20

**simplified**
60:8

**simply**
95:4
117:5

**single**
23:3

**sink**
72:20
74:1 89:4
95:6

**sinks**
74:2,6,9

**sitting**
6:9 90:10

**situation**
23:2

**sixth**
82:1

**sixty**
7:5

**size**
57:16
115:2,16

**sizes**
20:6
83:5,7

**skill**
23:12
43:13

**skimmed**
31:20

**skin**
116:13

**slots**
107:4

**SMD**
115:17

**smoothing**
97:19

**so-called**
57:2

**solder**
79:4

**solution**
90:7,9
107:9

**solutions**
75:14
107:11

**solvable**
90:6

**solve**
110:5

**solved**
90:5,7
110:4

**solving**
90:20
97:22,25
116:11

**sort**
11:12

**sorts**
14:15

**sounds**
67:14
87:15

**source**
99:19,21
100:13
103:5,7,
14

**sources**
104:20

**space**
21:1
57:12

**spaced**
93:2,8

**spacing**
82:14,19,
20

**span**
85:17
88:7

**speak**
12:4

**speaking**
103:23

**spec**
53:1
76:5,6,



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

16,17,21, 23 77:1, 2,9,20 88:5 109:24 121:14

**special**
82:19

**specific**
16:7 21:9 94:13 101:13 110:1 126:14

**specifically**
21:7,12 44:8 111:4 127:10 128:7

**specification**
73:4 76:18 77:17,19, 21 87:1, 6,11 110:3

**specifications**
59:2 122:14

**specifics**
16:17

**specs**
76:14 121:14

**spectrum**
63:9,10 114:13, 15,17,19, 20

**speculating**
121:3

**spent**
18:16

**spilled**
63:12

**spilling**
63:17

**spoke**
27:24

**spots**
50:25

**spread**
97:2

**spreader**
96:25 97:6,9,11 102:3,6, 17 103:22

**spreaders**
97:13,16

**spreading**
97:17,18, 23

**square**
83:1 117:6

**stability**
21:1

**stable**
109:18

**stacked**
66:23

**stage**
16:5 20:20 27:6 112:11 117:7

**stamped**
100:5 101:9

**standard**
20:11 23:6,7 28:19 29:9,20 30:7,9 31:1,3,7 56:13 119:23

**standards**
22:14,16 23:17,20 57:19

**stands**
20:9

**start**
12:12 107:2 112:7 113:16 116:24

**started**
25:16 112:5 120:16 122:11

**starting**
17:13 93:16 101:3,20 104:1 112:9

**starts**
28:14 32:25 36:5 45:19 61:23 93:19 99:17

**state**
18:2,7 116:10

**stated**
86:7,24 97:21 103:3

**statement**
67:5 84:19,21, 23 85:6 87:16 89:18 104:10

**states**
56:2

**stay**
66:9

**staying**
78:11

**step**
93:14

**steps**
57:10

**stick**
122:19

**sticking**
111:16

**stock**
26:15

**stop**
30:14 94:20,23

**straight**
70:21

**strict**
122:12

**strictly**
84:13 103:23

**strike**
100:8 116:23

**strip**
83:11

**structure**
25:19 37:15,17 69:15,23, 24 70:2 92:19 102:10,23 108:20

**structures**
111:25

**studied**
92:13

**studio**
24:16 27:6 79:25

**study**
23:17,20

**stuff**
104:11 121:13 122:12

**submitted**
6:6 124:4,10, 14,18,22

**submitting**
123:25

**substance**
7:16,21 9:16 123:14

**substantial**
50:10,16 53:18,23, 24 68:25



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

**substantially**
69:22

**substrate**
103:16

**Substrates**
103:18

**success**
22:8 66:5

**suffer**
76:25

**sufficient**
37:11
104:3
110:17
111:3,12
116:18

**suggesting**
104:24

**suit**
5:12,13

**suitability**
14:12

**suitable**
32:6
50:12
51:23
109:14
111:6
116:1
118:20

**supply**
57:18
108:5,10,13,14,17,21 109:2

**support**
25:9
37:14,17
42:22,25
43:2
69:15,23,24 70:2
87:7
108:20

**supported**
87:1

**suppose**
14:21

**surface**
37:15,18
51:15
94:2
95:9,14,24 97:7
101:22
103:20
107:12,15,19,20

**swore**
7:23

**sworn**
4:4

**Sylvania**
18:20
122:7

**system**
32:5,13
33:8,16,17 35:8
36:5 37:9
45:11
48:14
68:8,10,11 71:2
72:19
73:22
74:1
78:22,23
93:15,17
98:7
108:12
122:22

**systems**
19:15
44:13,15,18 45:2,4,8 74:3

**T**

**T12**
81:10
83:25
85:10
115:2
119:9
120:1,5

**T8**
115:2,16
119:9
120:1,5

**table**
56:17,18,19,20,21
58:11
59:24
60:3,4,7,8,9,14,20
61:3,6
62:2
72:4,5,9
75:21
76:10,11
77:12
81:18,19,21,23
84:3,14,17 85:11,12

**tables**
82:6

**taking**
86:9
87:22

**talk**
6:10
7:16,20
91:2 96:3
105:1

**talked**
54:15
96:8

**talking**
9:2 75:23
101:4,25
125:19
130:23

**talks**
43:11
90:12

**target**
57:12,15
59:1
87:25
88:4

**taught**
23:10
31:6
54:25

**teaches**
89:11
93:25

**teaching**
52:25
96:12
101:11

**technical**
14:11
117:2,12

**technically**
85:6

**technician**
45:14

**techniques**
89:9

**technology**
13:3 51:6
63:4 64:8

**television**
45:1,4,14

**telling**
76:15,22
83:10
90:5
110:4

**tells**
73:24
85:23
88:16

**temperature**
50:6 67:1
72:10,13,17,18
73:1,3,14
75:9,11
76:21,23
77:1,3,20,22,25
78:7 79:4
84:11
101:15
104:4,8,15,21
112:11

**temperatures**
58:25
73:8,16,21 75:24
132:1,2

**ten**
51:16
104:24
117:9

**ten-minute**
125:4

**term**
4:19,21
16:9
19:14
20:11
27:10
37:10



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

53:9 68:4 96:5 103:21 117:13

**terms**
84:19 103:23

**test**
49:8

**testified**
4:4

**testify**
7:24 8:3 30:5

**testifying**
8:7,12

**testimony**
7:16 9:16 14:9,18, 19 26:9 123:14,15 127:25 130:24

**testing**
83:17 92:6 122:8

**text**
28:3 120:4

**thermal**
20:24,25 37:9 50:7 66:2,4,21 68:25 72:19 73:25 74:6,20 75:2,8,14 79:21 80:8 85:23 88:17,19, 24,25 89:12,25 90:5,6,20 91:6,22 96:13 97:5,18, 23,25 98:7 101:19 106:16 107:7,8, 10 128:16 130:1

**thermally**
73:23

**thermals**
27:9 90:3

**thicker**
97:6

**thing**
32:21 40:23 47:5 52:15 54:18 56:23 67:14 119:16

**things**
22:7,12 35:16 38:6 48:16,17 54:15 75:5 115:11 120:8

**thirds**
56:21

**thought**
39:7 121:19

**throat**
67:13

**time**
13:17 20:23 30:15,16 43:9 50:18,21 51:8 54:1,4 55:1 62:9,24 65:9,10, 17 67:7 68:12 75:1 80:21 81:11 83:6 115:10 116:8,11, 16 121:4 123:19 125:22 126:8

**times**
5:4,5

**tiny**
50:24

**titled**
55:23 58:17

**titles**
19:18 20:16

**today**
4:7 6:5 7:16,25 8:4 10:22 15:15 17:10 26:4 80:18 90:10 122:25 127:25 128:1

**told**
90:18 98:18 100:1

**tolerance**
57:24

**top**
13:13 17:5 19:11 25:8 31:25 37:16,19 58:6 69:9,23 70:11 71:22 78:4 98:23,25 119:19

**top-most**
66:25

**topic**
91:20

**topics**
14:16

**total**
82:22 117:10, 16,18,19 128:12

**trace**
121:16

**Trademark**
4:15

**tradeoffs**
72:23

**transcript**
6:22

**transfer**
102:10

**transferring**
97:8

**translucent**
51:13,17, 19 52:10 53:4

**transparent**
51:13

**trapping**
100:25

**true**
13:25 121:16

**truthfully**
7:25 8:4, 8,12

**tube**
32:9 49:7 50:11 52:4,10 53:5 66:24 70:9,11, 17 82:21 83:15 97:13,15, 16 100:23,25 101:1 102:20 103:17 115:1,17 120:1,5 131:7

**tubes**
66:22,25 70:19 100:22

**tubular**
114:25



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

**tungsten**
81:11
82:2
112:13
118:5,18

**turn**
18:12
32:25
56:11
71:16
106:25

**TV**
21:12
24:16,24,
25 78:13

**two-step**
57:8,15

**type**
20:22
23:24
68:9,11
81:12
102:22
121:7

**types**
19:8
113:4

**typical**
62:21
77:19
83:5,7
116:15
119:8

**typically**
7:5 51:4
63:21
116:12

**typo**
60:15

**typos**
84:15

**U**

**U.S.**
4:15
22:20
42:2
46:10,25

**UL**
115:19

**ultraviolet**
113:18

**uncovered**
49:7

**understand**
4:13,19
6:1 8:1
13:21
15:15
21:22,24
33:14
38:1,23
49:5 52:7
53:15
61:3,18
75:4
77:16
78:9
86:8,25
87:6,23
88:14
90:17
102:15,21
103:1,22
110:23,25
114:10
116:7,17
128:18

**understanding**
9:18
22:3,19
61:6
63:24
86:10
127:14
131:8,25

**understands**
89:6

**understood**
6:16 7:2,
18,22
54:3
73:25
113:1
119:24
130:22

**undue**
89:21

**uniform**
20:18,19

**unit**
84:5

**units**
81:22
82:5
84:4,14
85:13

**unreliable**
120:24

**unsuitable**
121:1

**up-to-date**
19:2

**updated**
13:14,17

**upper**
105:14,20

**URL**
119:19

**usual**
11:10

**utilized**
104:15

**V**

**vague**
57:21
68:5
86:17
90:15
91:19

**values**
84:8
87:17,18

**varies**
111:11

**vents**
107:20

**verbal**
6:20

**verbatim**
35:1
87:15

**version**
37:5

**versus**
14:18
22:2 79:4

**vertically**
66:23

**view**
28:17
99:18
126:5

**violet**
114:18

**visible**
52:19
53:5
63:9,10
114:17

**volts**
115:19
118:1

**W**

**wait**
45:22
91:16
96:21

**walk**
61:22
69:11

**wanted**
25:14
63:19
65:21
72:25
75:15
119:6

**warm**
81:12
112:13

**wasted**
63:13

**watt**
120:1

**wattage**
108:22,25
109:2

**watts**
58:12
108:13
115:18

**wavelength**
63:16
114:20

**wavelengths**
64:1

**waving**
58:23

**Wayback**
119:17,23



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613

**ways**
15:8
20:24

**well-known**
59:7
72:23
113:12,24

**whatsoever**
28:5,6

**white**
32:6
58:24
59:4,6
112:13,14
113:5,7,
18 114:1,
10,20
115:18,25
118:5,9,
10,15,17,
20 119:2,
3

**wide**
63:10
64:9

**wider**
97:7

**width**
103:16
128:11

**wonderful**
97:8

**word**
24:13
32:16
33:20,21
34:4,11,
17,18
35:2,10,
19 37:8,
25 53:3
62:8
88:23

**wording**
9:14

**words**
34:2
53:22
77:19
78:2
114:1

**work**
7:7 9:20
25:21
26:17
45:13
103:3
123:6
126:11

**worked**
25:2 56:7
120:19

**working**
32:20
50:21

**works**
6:1 21:5

**world**
50:19

**worse**
67:4
76:18

**Wow**
19:11

**wrap**
78:15

**wrapping**
78:14

**written**
87:1,7

**wrong**
53:6
60:17
93:5
121:14

**wrote**
25:17

**Wunderlich**
124:19,20

**X**

**x-lamps**
110:10

**X-RE**
110:10

**XLAMP**
55:23

**Y**

**year**
5:17 46:6

**years**
44:12,14
45:13
67:25
68:9 75:6
77:5 78:5

**years'**
44:25
45:3



QUASAR SCIENCE LLC EXHIBIT 1039
QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC.
IPR2023-00613