D. Brahmbhatt

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MACRONIX INTERNATIONAL CO., LTD., MACRONIX ASIA LIMITED, MACRONIX (HONG KONG) CO., LTD., and MACRONIX AMERICA, INC.,

Petitioner,

- against -

IPR2014-00105
Patent 6,731,536 B1

SPANSION, LLC,

Patent Owner.

VIDEOTAPED DEPOSITION OF

DHAVAL J. BRAHMBHATT

New York, New York

Tuesday, July 2, 2014

Reported by:

THOMAS A. FERNICOLA, RPR

JOB NO. 81809

D. Brahmbhatt

July 2, 2014
9:02 a.m.

Videotaped Deposition of DHAVAL J. BRAHMBHATT, held at the Law Offices of Winston & Strawn, LLP, 200 Park Avenue, New York, New York, before Thomas A. Fernicola, a Registered Professional Reporter and Notary Public of the State of New York.

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- and -

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ALSO PRESENT:

D. Brahmbhatt

THE VIDEOGRAPHER: This is the start of tape labeled No. 1 of the videotaped of Dhaval Brahmbhatt in the matter of Macronix International Company, Limited, et al., versus Spansion, LLC, in the United States Patent and Trademark Office, Before the Patent Trial and Appeal Board, Case No. IPR2014-00105.

This deposition is being held at 200 Park Avenue, New York, New York, on July 2nd, 2014, at approximately 9:02 a.m.

My name is Robert Rinkewhich from TSG Reporting, Inc. and I'm the legal video specialist.

The court reporter is Tom Fernicola, in association with TSG Reporting, Inc.

Will counsel please introduce yourself.

MR. BAUGHMAN: J. Steven Baughman, from Ropes & Gray, for Patent Owner.

MS. JABIDO: Janice Jabido, Ropes & Gray.

MR. MURRAY: This is Michael Murray from Winston & Strawn, for Petitioners.

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THE VIDEOGRAPHER: Will the court reporter please swear in the witness.

D H A V A L J. B R A H M B H A T T,
called as a witness, having been duly sworn by a Notary Public, was examined and testified as follows:

BY THE REPORTER:

Q. Please state your full name and address for the record.

A. Dhaval J. Brahmbhatt, 25 North 14th Street, Suite 400, San Jose, California 95112.

MR. BAUGHMAN: Counsel, just at the outset, I want to state for the record the parties' stipulation that to save time testimony on background issues in this deposition can be used and entered in IPR2014-00108, as well as in this trial proceeding; is that right?

MR. MURRAY: Yes. That is right. It will probably be obvious when you finish the background, but maybe if you would just sort of state for the record so we have a clear --

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even a slightest change, you had to go through a defined process of approval with the customer.

So sometimes the documentation will be determined by that large customer we had, but other than that, we had standard documentation.

Q. What kind of standard documentation --

A. The company had a documentation department and all these things were properly documented.

Q. We've been talking about the example of National Semiconductor.

Did you also have documentation at other places you worked?

A. Oh, yes. I think, in fact, the first thing I learned when I started at VISHAY Semiconductor, the documentation was actually over there even more strictly enforced. So that was good training to start with.

Q. And when you were at Smart Module and you were looking at different semiconductor products from different vendors, how would you

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determine as an initial cut what features were in the different products?

A. That's a good question. As I mentioned, at Smart Modular, we were doing subsystems, modules or cards, as we called them, memory cards. And the primary component, flash memory was a primary component.

And as it turns out in our industry, these things are usually compatible with each other; in other words, when you look at data sheets, people try to, whether you pick from Vendor A, Vendor B, Vendor C, if they're competing in that market with a product that has the same density, then they would come up with data sheets that are compatible.

So there are industry acceptable standards, you know, developed by organizations such as jdac and others where these things are standardized; and, therefore, more often than not, you will find data sheets that are quite compatible with each other.

Q. And the data sheets would be something you looked at Smart Module or other companies to understand what was in the chips?

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A. That would be the primary thing I would look at. And coming from the semiconductor industry, I had also developed data sheets, so I was quite familiar with those documents.

Q. I think you testified that at National Semiconductor, one of the changes that was happening for your product line which was successful was introducing higher densities.

Can you talk a little bit more about what that means?

A. Well, and that happens and that was not unique to National Semiconductor, I should say. Companies, you know, year after year they would come up with new products. Sometimes they would involve just the same density and additional features, but quite often that would involve expanded size of the memory, higher density that was put in.

Q. So by that you mean more memory in the same space?

A. I don't know if it was the same space. The reason being, the chip size would vary; in other words, as you -- as you come up

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with a higher density memory product, there is always a combination of what technology you would use, what cell size you would use.

So, as an example, as you go through manufacturing, you are able to, using the same technology, develop a smaller memory set over a period of period of time as you learn, because initially on purpose you make it a little larger so that you are able to at least produce it. And then as you learn more, you get a better handle over manufacturing issues.

So sometimes you could introduce a higher density product using the same manufacturing technology, but the cell size may be smaller. Therefore, even though the memory density is higher, the size of the chip may not increase as much. In other words, just because you doubled the number of memory cells, the size of the chip may not increase by the same ratio.

Now, that is one aspect. The other one would be that we would deploy a new technology, process technology, and the advanced process technologies then would allow

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you to make substantial reduction in the size of the chip, and, therefore, the old ratios will change again. So there were just different factors that would come into play.

Q. But you were trying for a smaller size and higher density when that was possible?

A. That's common in the industry that people would try to, we call it -- and I've said that somewhere in my report, it's the most expensive real estate in the world. So you try to, as far as possible.

But you have to be judicious about it; in other words, there are design rules that have to be followed and the design rules are developed in collaboration by all people involved, you know, processing units, design engineers, manufacturing engineers, all these people, device engineers, they all get together and, you know, agree on what can be done.

Q. I think you mentioned earlier that one of the other things you were focusing on were design changes in your product line, was it scribe line structuring?

A. I did not mention, but, yes, scribe

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lines are also an important aspect of a chip, because you've got this wafer, and then there are multiple copies of the same device that are being produced on one wafer. And they're separated from each other by structures called scribe lines, where you use a diamond saw after the wafer is finished being processed, and then you use a diamond saw to cut through those.

And they look like the streets in a city like New York when you look from the top and they run vertical and horizontal, and you use a diamond saw to -- now they are using laser saw, as well. So one way or the other you just cut through that structure called scribe line, as the name suggests, you scribe through it, and then you are able to pick up individual chips that will be then packaged into semiconductor devices that will be then used in systems.

Q. And these developments we've been talking about, higher densities, what we just discussed in scribe lines, were those features that were important generally to people designing chips at the time, in your

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understanding?

A. Can you repeat the question?

Q. Yes.

So we talked a little bit about some of the design changes you considered at National Semiconductor, looking at trying to get more density on chips; correct, that was one of them?

A. Also adding features. I mean, there were a whole bunch of things. Making the chips more manufacturable. I mean, I would be on the test floor. I would be in the manufacturing, you know, facility. I would be going regularly to the packaging facility that we had in those days at Bangkok.

So, I mean, a variety of things. And I had the ability to roll up my sleeves and work with the engineers. So it was not just one thing.

Q. Were these challenges that people faced in the industry generally?

A. Oh, yes, yes. I don't think it was anything unique offered in that sense to me. I think maybe the difference was that this

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product line, and probably that's true for many memory products, your profit margins are thin, and you're trying to -- you're trying to squeeze even a fraction of a penny from anywhere you can. So those things are important.

Q. So, obviously, losing -- losing chips in the manufacturing process would cost you money; right?

A. Oh, yes, yes. So that is part of it. But you could lose chips many different places. For example, you could -- people could steal your stuff. I mean, these things happen.

And so, therefore, you know, one of the references we have talked about how to trace lost -- so it's important, but also managing the cost of different steps, how much would you pay for that blank wafer, how much did you pay for packaging that unit, how much did you pay for testing it. Everything else.

Q. And you said it's some of the most expensive real estate in the world.

So the way you use area on a chip has an impact on cost, as well?