

United States District Court,
N.D. California.

ATMEL CORP,
Plaintiff.

v.

INFORMATION STORAGE DEVICES, INC,
Defendant.

No. C 95-1987 FMS

Feb. 27, 1998.

The patentee sued for infringement of three patents relating to the production and design of computer memory chips. The District Court, Fern M. Smith, J., construed several disputed terms in the claims of the patents at issue.

Patents construed.

4,511,811, 4,701,776, 4,822,750. Cited.

Richard H. Abramson, Lee Van Pelt, Sarah W. Anderson, Heller Ehrman White & McAuliffe, Palo Alto, CA, for Plaintiff.

Claude M. Stern, William A. Fenwick, Sandra Smith McCoy, Fenwick & West LLP, Palo Alto, CA, for Defendant.

ORDER CONSTRUING '750, '776, AND '811 PATENTS; DENYING CROSS-MOTIONS TO STRIKE; AND DENYING IN PART AND SETTING BRIEFING SCHEDULE ON DEFENDANT'S MOTION FOR SUMMARY JUDGMENT OF INDEFINITENESS

FERN M. SMITH, District Judge.

INTRODUCTION

Pending before the Court is the parties' dispute about the proper construction of three patents that relate to the production and design of computer memory chips, called EEPROMs, that are programmable, electrically erasable, and non-volatile. These chips are useful in applications, such as programmable car radios, in which it is advantageous to enable the device to be programmed by the user, but to retain its information when power to the device is disconnected. Two of the patents at issue, patent number 4,822,750 ("the '750 patent") and patent number 4,701,776 ("the '776 patent") respectively, describe a process for manufacturing and a particular physical embodiment of such chips. These patents spring from a single application; FN1

although they have different claim language, they retain identical specifications that describe both the process and the device.

FN1. The original patent application for the '776 and the '750 patents, number 527,213, dates back to August 1983. That application was abandoned, and a continuation application, number 936,965, was filed in December 1986. While that continued application was pending, the applicants filed a second continuation application, number 74,085, in July 1987. The first continuation was issued as the '776 patent in October 1987; the second continuation was issued as the '750 patent in April 1989. The '776 and the '750 patent thus share the same prosecution history up to July 1987.

Programming EEPROMs requires higher voltages than are normally supplied to chips. The third patent, number 4,511,811 ("the '811 patent"), describes a combination of electrical circuits that enables programming voltages to be generated on the chip instead of supplied from an external high-voltage source, an innovation that saves space and allows the devices to be manufactured more cheaply.

In June 1995, plaintiff filed a complaint in federal court alleging that defendant was infringing these patents. The Court held two tutorials, conducted off the record, in late 1996 and 1997, in order to understand the technology underlying the patents. Briefing on the issue of claim construction began in October 1997. In November 1997, defendant filed a motion for summary judgment of indefiniteness, which it requested the Court consider simultaneously to the claim construction. The Court vacated the hearing on that indefiniteness motion, ruling that it would be more efficient to consider it after it had construed the claims. Defendant also moved to strike a portion of the declaration of plaintiff's counsel on the ground that it contained argument rather than fact; plaintiff moved to strike the declarations of defendant's experts on the ground that they contained argument and legal conclusions. The Court took these motions to strike under submission.

A *Markman* hearing was held January 12 and January 13, 1998, at which the Court heard limited expert testimony to clarify several ambiguous terms. Having considered the parties' extended briefs and the evidence and arguments presented at the hearing, the Court issues the following ruling.

DISCUSSION

I. Legal Standard for Claim Construction

A. General Principles

[1] [2] [3] [4] [5] The Court ordinarily determines the meaning and scope of a patent as a matter of law. *See Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 371-73, 116 S.Ct. 1384, 1387, 134 L.Ed.2d 577 (1996). In construing a patent, the Court considers three sources, known as intrinsic evidence: the claims, the specification, and the prosecution history. FN2 *See Unique Concepts, Inc. v. Brown*, 939 F.2d 1558, 1561 (Fed.Cir.1991). "[U]nless the specification or the file history indicates that the inventor intended otherwise, a claim term will be accorded its ordinary and accustomed meaning." *Wolverine World Wide, Inc. v. Nike, Inc.*, 38 F.3d 1192, 1196 (Fed.Cir.1994). The Court will refer to extrinsic evidence, such as expert and inventor testimony, dictionaries, and learned treatises, only if the claim terms are ambiguous and are not defined by the specification and prosecution history. *See Vitronics Corp. v. Conceptor, Inc.*, 90

F.3d 1576, 1584 (Fed.Cir.1996).

FN2. Defendant raises arguments in its briefs based on the doctrine of prosecution history estoppel. Prosecution history estoppel, however, is only applied to consideration of infringement under the doctrine of equivalents, a subject the Court does not address in this claim construction motion. *See Southwall Tech., Inc. v. Cardinal IG Co.*, 54 F.3d 1570, 1578 (Fed.Cir.1995). The Court therefore declines to consider prosecution history estoppel in this motion.

[6] It is generally improper to limit the scope of the claim to examples used in the specifications, *see Electro Med. Sys. v. Cooper Life Sciences*, 34 F.3d 1048, 1054 (Fed.Cir.1994), although the Court may use the patent specification to ascertain the meaning of a claim. *See Unique Concepts, Inc. v. Brown*, 939 F.2d 1558, 1561-62 (Fed.Cir.1991). Means-plus-function claims present a special case, however. When such a claim discloses a means for performing a function "without the recital of structure, material, or acts in support thereof, ... such claim shall be construed to cover the corresponding structure, material, or acts disclosed in the specification and equivalents thereof." FN3 35 U.S.C. s. 112, para. 6; *see also Valmont Industries, Inc. v. Reinke Manufacturing Co.*, 983 F.2d 1039, 1042 (Fed.Cir.1993).

FN3. The parties stipulated that the Court should not consider the scope of equivalents under this section during the Markman hearing.

[7] [8] Under a means-plus-function analysis, if the specification mentions specific alternative structures, those structures are included in the scope of the patent. *See Serrano v. Telular Corp.*, 111 F.3d 1578, 1583 (Fed.Cir.1997). A specification that merely mentions the possibility of alternative structures without specifically identifying them is not sufficient to expand the scope of the claim beyond the example used. *See Fonar Corp. v. General Elec. Co.*, 107 F.3d 1543, 1551 (Fed.Cir.), *cert. denied*, 522 U.S. 908, 118 S.Ct. 266, 139 L.Ed.2d 192 (1997).

B. Construction of Related Patents

[9] Identical or "indisputably interchangeable" claim terms in patents that share a common ancestry should be construed consistently. *See Abtox v. Exitron Corp.*, 122 F.3d 1019, *amended* 131 F.3d 1009, 1010 (Fed.Cir.1997) ("gas-confining chamber" and "gas-tight confining chamber" were "indisputably interchangeable"); *Jonsson v. Stanley Works*, 903 F.2d 812 (Fed.Cir.1990). Nothing in these cases, however, extends the rule to terms that are merely "similar" or "parallel," as defendant would have the Court hold.

[10] [11] Notwithstanding this special rule about identical or "indisputably interchangeable" claim terms, it is improper to use a portion of a parent's specification that relates solely to one child patent to construe directly a different child. *See Abtox*, 122 F.3d at 1027. In using prosecution history, "statements in the parent application must be confined to their proper context." *Id.* at 1026-27 (where parent application disclosed both microwave and radio frequency technology, it was error to import limitations relating to radio technology into a child patent solely relating to microwave technology).

II. Construction of the '776 Patent

At the time the '776 patent was issued in 1987 (the '750 patent was issued in 1989), EEPROMs were known in the prior art. *See '776 patent*, 1 :16-2 :32. The '776 patent describes an improved structure for such a

device, which was intended to reduce the sensitivity of the chips to minor variations in the positions their component parts, enabling the chips to be successfully mass-produced in smaller sizes.

The '776 patent claims:

1. An electrically programmable, electrically erasable MOS memory device for use in a memory array having a plurality of memory cells arranged on a substrate of a first conductivity type, said substrate having at least one well structure of a second conductivity type formed therein to a first predetermined depth in a region other than the substrate region which supports said plurality of memory cells, said memory device comprising:

spaced apart first and second doped regions of a second conductivity type in said substrate, the substrate area between said first and second doped regions serving to establish a channel for said memory device;

field stop regions in said substrate having edges defining the sides of said channel for said memory device and for separating each of said memory cells from others of said memory cells in said array;

a third doped region of said second conductivity type in said substrate formed to a depth less than said first predetermined depth of said well structure in order to provide a source of charge carriers, a portion of said third region extending from said first doped region into said substrate area between said first and second doped regions to define the length of said channel, another portion of said third doped region extending appreciably under the edges of said field stop regions which define the sides of said channel;

an electrically isolated first conductive gate disposed above said substrate between said first and second doped regions;

a first insulating layer separating said first conductive gate from said channel in said substrate, said first insulating layer including a section formed over said third doped region to permit the passage of charge carriers between said third doped region and said first conductive gate, said section having a thickness which is less than the thickness of the remainder of said first insulating layer; and

a second conductive gate disposed above and insulated from said first conductive gate.

A. "appreciably under"

[12] [13] The patent requires that "another portion of said third doped region extend[] appreciably under the edges of said field stop regions which define the sides of said channel." Defendant argues that "appreciably under" requires that the third doped region be formed before the field stop regions. Defendant points out that the process portion of the specification states that "the third region ... is defined and implanted ... prior to defining the field oxide channel stop regions." '776 patent, 3 :48-51. It is inappropriate, however, to limit a product patent to a manufacturing process described in the specification. *See Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1541 (Fed.Cir.1983). Moreover, no reasonable person would believe that the ordinary meaning of "appreciably under" refers to a production process rather than a spatial relationship. The Court therefore will not adopt defendant's interpretation.

Plaintiff proposes that "appreciably under" means that the third doped region must extend "far enough under ... so that the edges of the third doped region are not exposed to the thin portion of the first insulating layer."

Joint Constr. Ex. B at 6. Defendant objects that this is a "functional" definition precluded by the holding in *York Products, Inc. v. Central Tractor Farm & Family Center*, 99 F.3d 1568, 1573 (Fed.Cir.1996). The Court disagrees. In *York Products*, the Federal Circuit construed claim language that required that a ridge extend "for at least a substantial[] part of the entire height" of the sidewall of a pickup truck bed. Construing "substantial part" to mean "nearly the entire length of," the court refused to adopt a "functional definition" of the term "substantial," according to which the term would mean "only so [high] as necessary" to accomplish the function of the structure. *Id.* at 1572-73. Plaintiff's construction would be such a "functional definition" if, for example, it required that the doped region be "far enough under to prevent voltage breakdown." Instead, plaintiff's construction is purely spatial.

Plaintiff's proposed construction, moreover, is consistent with the specification, which states that by extending the third doped region appreciably under, "it is assured that the resulting structure is free from any exposed N+ edges under the tunnel dielectric region." '776 patent, 6 :13-15. The use of the term "assured" suggests that the third doped region must extend far enough under that its edges are not exposed to the thin portion of the first insulating region no matter what the width of the thin region. The Court therefore adopts plaintiff's construction of the term "appreciably under."

B. "sides of said channel" and "field stop regions"

[14] The '776 patent requires "field stop regions in said substrate having edges defining the sides of said channel for said memory device and for separating each of said memory cells from others of said memory cells in said array."

One dispute about the field stop regions involves whether they must enclose all four edges of the memory cell, as defendant claims, or whether they must only define the sides of the cell and not necessarily the ends, as plaintiff claims. The word "sides" in the claim language might conceivably mean any edge (as in the phrase "a square has four sides") or might mean "side" as opposed to "end" (as in the phrase "the sides of a truck"). The specification uses the word "side" in the latter sense, suggesting that that is what is meant by the claim as well. *See* '776 patent, 5 :14-15 ("memory cells may be separated ... from one another at the channel ends ... and at the channel sides"); *Unique Concepts, Inc. v. Brown*, 939 F.2d 1558, 1561-62 (Fed.Cir.1991) (court may use specification to ascertain the meaning of the claim). The specification also describes groups of mirror cells with no "channel end field oxide regions ... separating individual cells at the channel ends." '776 patent, 5 :20-23. Defendant's proposed reading would make impossible such mirror cells. Despite defendant's contention to the contrary, plaintiff's construction of "sides" is consistent with the claim language requiring the field stop region separate "each cell" from "others" in the array. This language can be read to mean that the region must separate the cell from "some others," not from "all others." The specification of the '776 patent therefore strongly supports plaintiff's construction.

Defendant argues that the term "field stop regions" in the '776 patent should be construed consistently with the term "field oxide regions" in the '750 patent. *See Abtox v. Exitron Corp.*, 122 F.3d 1019, *amended* 131 F.3d 1009 (Fed.Cir.1997) (requiring consistent construction of "indisputably interchangeable" terms in patents with a common ancestor). With this argument, defendant seeks to import the requirement of the '750 patent that there be "four opposed field oxide regions." '750 patent, 12:53. The Court is not convinced that "field stop regions" and "field oxide regions" are indisputably interchangeable terms. Even if they were, *Abtox* would not require that device claimed in the '776 patent have four such regions as opposed to two. In *Abtox*, the Federal Circuit held that it was inconsistent to construe the singular term "gas-confining chamber" to mean "a single chamber" in one patent but "multiple chambers" in a related patent. *See Abtox*,

122 F.3d at 1022. *Abtox* would control the outcome here if both patents claimed a singular "region," and the parties were disputing whether a "region" encompassed four sub-regions or two subregions. The patents in this case, however, both describe multiple "regions." The fact that the patents happen to require different numbers of such regions does not mean that the term "regions" is being construed inconsistently. The Court therefore holds that the field stop regions in the '776 patent need only define the sides, and not necessarily the ends, of the memory cell.

A second dispute involves what substances may compose the field stop region, and where the region may be located. Plaintiff argues the field stop region may be "any oxide which functions to partially or completely separate one structure from another." This proposed definition is too broad. The claim language does not suggest that the field stop regions can separate any structures; rather, it specifies that field stop regions must separate memory cells from other memory cells. Nor does plaintiff provide any convincing argument for why "separate" can mean "partially separate." If two memory cells are only "partially separated," and so contact each other, they are not "separated" in the normal meaning of the term.

Defendant's proposed construction, however, is too narrow. Defendant argues that the field stop region must include both the field oxide region and the channel oxide region described in the specification, and that those regions cannot reside within the "active device region" of the memory cell. Defendant has not explained why there must be either the particular field oxide or channel oxide regions described in the specification, so long as there is a region defining the channel sides and separating cells from other cells. To hold otherwise would be improperly to limit the device to the preferred embodiment described in the specification. Nor has defendant provided anything other than expert testimony as an explanation for why the claim language means that the field stop regions cannot encroach upon the "active region." Under *Vitronics*, in the absence of an ambiguity, this is not a permissible way to interpret the claim language.

The Court holds that the claim means neither more nor less than what it actually says. The patent requires that there must be field stop regions located in the substrate that define the channel sides and that completely separate cells from at least some other cells.

C. "memory cell"

[15] The parties dispute the scope of the term "memory cell." Defendant argues that the term refers only to a cell that has a single select device and a single memory device. Plaintiff argues that as used in the patent, a "memory cell" can also encompass a cell with repeating elements that share the use of common regions, and which may contain multiple select and memory devices. Plaintiff refers to such a cell as a "mirror cell," although as discussed below, the Court believes that the term "mirror cell" is used in the specification with a different meaning.

The specification contemplates the creation of mirror cells: "As will be readily understood by those skilled in the art, 'mirror' cells may be formed in order to facilitate the integration of many memory cells into an array." '776 patent, 5 :16-19. The Court believes that the specification uses the term "mirror cell" not with plaintiff's meaning, but rather to refer to an individual memory cell containing only a single select and memory device that lacks channel end field stop regions on both ends and that shares a region with at least one other such cell. That definition of "mirror cell" is consistent with the specification's statement that if mirror cells are formed, "channel end field oxide regions 13 [sic] FN4 will separate groups of mirror cells as is known in the art, rather than separating individual cells at the channel ends as shown in Fig. 1." '776 patent, 5 :21. The description of the entire mirrored assemblage as a "group of mirror cells" rather than as a

single "mirror cell" suggests that a mirror cell is an atomic unit, not a collection of cells.

FN4. In the rest of the specification, the channel *end* field oxide region is labeled as region 12, and the channel *side* field oxide region is labeled as region 13. See '776 patent, 5 :15-16, 6 :11, 5 :14-15. The Court concludes that in the quoted passage, the drafter meant to refer to the channel *end* field oxide region, but erroneously labeled the region as 13 instead of 12.

The terms "individual cells" and "mirror cells" in the specification thus each appear to denote cells with only a single memory and select device, distinguished only by the presence or absence of channel end field stop regions. Moreover, the specification later states that the "[t]he memory cell of the present invention ... includes a single gate select device ... [and] a floating gate memory device." '776 patent, 2 :64-68.FN5 The Court therefore holds that the term "memory cell" in the '776 patent refers to a cell with a single select and memory device.

FN5. The patent specification also states that "for purposes of this disclosure, a memory cell ... includes at least a memory device and a select device." '776 patent, 1 :61-65. Although this might be read to mean that a memory cell could contain multiple memory and select devices, it does not conclusively establish that, as the term "at least" might also refer to the presence of devices other than memory and select devices.

D. "first doped region" and "second doped region"

[16] The parties agree that the claimed memory device must have a drain region and a source region. Defendant argues that the "first doped region" must be the drain and the "second doped region" the source of the device. Plaintiff argues that each term can refer to either the drain or the source.

The specification supports defendant's construction. The claim states that a portion of the third doped region must "extend[] from" the first doped region. "Extension from" describes physical contact. Figure 5 of the specification, an alternative embodiment, shows the third doped region (labeled as region 33) touching only the drain (region 18), not the source (region 16). If the claim were construed to allow the first doped region to be the source, then the specification would depict a device in which no portion of the third doped region "extended from" the first doped region, a device not covered by the claim language.

The same analysis holds true for the preferred embodiment, depicted in Figure 1 of the specification. Although that diagram shows portions of the third doped region touching both the source (region 16) and the drain (region 18), region 33b, the portion of the third doped region depicted as touching the source region, is described as optional, whereas region 33a, the region depicted as contacting the drain, is required. '776 patent, 10 :6-9. If the optional portion is absent, and the claim were construed to allow the first doped region to be the source, then this preferred embodiment would also not be covered by the claim language because no portion of the third doped region would extend from the first doped region. It is "rarely, if ever, correct and would require highly persuasive evidentiary support" to construe a claim such that the preferred embodiment in the specification falls outside the scope of the patent. *Vitronics*, 90 F.3d at 1583.FN6 Here, plaintiff's construction could exclude both the preferred and the alternative embodiments.

FN6. *Maxwell v. J. Baker, Inc.*, 86 F.3d 1098 (Fed.Cir.1996), *cert. denied*, 520 U.S. 1115, 117 S.Ct. 1244, 137 L.Ed.2d 327 (1997), is not to the contrary. That case held that an unclaimed embodiment in the

specification could not be used to support a finding of infringement under the doctrine of equivalents. *See id.* at 1106-08. The case thus did not speak to the issue of claim construction, an analytical stage that precedes and is distinct from the determination of infringement.

Plaintiff's argument in response is based on an amendment to the claim. The claim originally required "spaced apart doped source and drain regions ... [and] a third doped region ... electrically connected to said drain region." Hudson Decl. Ex. C at 27. During the proceedings before the patent office, the applicants amended the claim to read "spaced apart first and second doped regions ... [and] a third doped region ... extending from said first doped region." '776 patent, 12 :51-65. The Court is not certain whether this amendment was made to broaden the claim or for some other purpose, such as to avoid confusion with the use of the term "source" to describe the third doped region as a source of charge carriers for the floating gate. The Court therefore finds that there is not the kind of "highly persuasive evidentiary support" required by *Vitronics*, and holds that the "first doped region" must be the drain, and the "second doped region," by extension, the source.

E. "above ... [and] between"

[17] The patent requires "an electrically isolated first conductive gate disposed above said substrate between said first and second doped regions." '776 patent, 13 :3-5. Defendant argues the word "between" requires that the gate span the entire distance between the source and the drain. Plaintiff argues that the word requires only that the gate be located somewhere in between the source and the drain.

Plaintiff's construction is the ordinary meaning of the word "between." As plaintiff points out, a chandelier can be "above" a table and "between" the two table ends without extending the table's entire distance. Unless the patent provides a different meaning, this ordinary construction must be adopted.

Defendant argues that the patent originally claimed a floating gate disposed "generally between" the source and the drain, and was amended to "between" to narrow the claim in the face of a prior rejection, thus requiring that the gate span the entire distance. Plaintiff responds by arguing that there was no prior rejection on basis of the floating gate's size, and that the modification was made simply for the purpose of clarity. Neither side cites to any part of the prosecution history that supports its version of events. The Court agrees with plaintiff, however, that the modified patent is clearer than the original, because the phrase "generally between" might have been construed to mean either "usually between" or "partially between." Having no solid reason to adopt defendant's out-of-the-ordinary construction of the term, the Court adopts plaintiff's construction.

F. "memory array"

[18] The preamble to the '776 patent describes an "MOS memory device for use in a memory array having a plurality of memory cells." '776 patent, 12 :44-45. The second claim of the patent then incorporates the term "memory array" by referring to "said array." '776 patent, 12 :59. The parties agree that this phrase requires that the claimed memory cell must be located in a memory array. They dispute, however, the allowable location of a "memory array." Defendant argues that the memory array must be "located somewhere other than in peripheral circuitry"; plaintiff argues that the memory cell can be "integrated with peripheral circuitry."

The claim language itself says nothing about where an array can or cannot be located. The specification

states that "a memory cell is a basic unit which may be duplicated a desired number of times to be integrated with appropriate peripheral circuitry to form a memory array." '776 patent, 1 :61-64. This language cannot be read to mean that a memory cell must be located somewhere other than the peripheral circuitry. Rather, it appears simply to mean that the integration of the cells and whatever peripheral circuitry is required forms the array. The Court therefore adopts plaintiff's construction of the term "memory array."

G. "disposed above"

[19] The final claim of the '776 patent requires that there be a "second conductive gate disposed above and insulated from said first conductive gate." '776 patent, 14 :6-7. Although defendant originally asserted in the joint claim construction statement that the upper gate had to be "aligned" above the lower gate, it did not argue that position in its briefs. The parties now appear to agree that although the second conductive gate must be "above" and separated from the first conductive gate, it need not be perfectly aligned. Seeing no evidence to suggest that the gates must be aligned, the Court agrees that this is the ordinary interpretation of this phrase and construes the claim accordingly.

H. "third doped region"

[20] The '776 patent requires "a third doped region ... a portion of said third region extending from said first doped region into said substrate area between said first and second doped regions to define the length of said channel, another portion of said third doped region extending appreciably under the edges of said field stop regions." '776 patent, 12 :60-13 :1. Defendant argues that this requires a single contiguous third doped region (called the "tunnel implant region"); plaintiff argues that the region may be "segmented."

Plaintiff is correct. The patent specification states that the tunnel implant region "may consist of two segments," which are depicted in Figure 1 as being non-contiguous. '776 patent, 10 :4. The patent should only be construed to forbid such an embodiment on the basis of "highly persuasive" evidence. *Vitronics*, 90 F.3d at 1583. Defendant's arguments do not rise to that level. The use of the term "region" in the singular in the claim does not indicate that the region must be contiguous, given the contrary use of the term in the specification. Nor does the Court accept defendant's argument that the claim language requires the second doped region to define only one end of the channel. Even if the third doped region defines both ends of the channel, as depicted in Figure 1, the portion of the third doped region extending from the first doped region can still be described as extending into the area between the first and the second doped regions. The Court holds that the "third doped region" need not be contiguous, but can be as depicted in Figure 1.

I. "first insulating layer"

[A] first insulating layer separating said first conductive gate from said channel in said substrate, said first insulating layer including a section formed over said third doped region to permit the passage of charge carriers between said third doped region and said first conductive gate, said section having a thickness which is less than the thickness of the remainder of said first insulating layer.

'776 patent, 13 :6-14 :5. The parties dispute several characteristics of the first insulating layer. First, defendant contends that the first insulating layer must have only two thicknesses; plaintiff asserts that the patent only requires that one section of the layer be thinner, and that the rest can span any range of thicknesses so long as it is thicker. Defendant's argument in support of its construction is simply that the term "layer" cannot describe a stratum of varying thickness. Perceiving nothing in the meaning of the word

"layer" that so restricts the patent, the Court adopts plaintiff's construction.

Second, defendant argues that the thin region must extend the entire width of the channel (that is, it must extend all the way to the field oxide regions which mark the channel's edges); plaintiff argues that it need not extend the entire width. Nothing in the claim language explicitly limits the shape or extent of the thin region. Nor does the Court's earlier construction of the term "appreciably under" require the thin region to extend all the way to the field oxide regions. The Court is aware that if the thin region did not extend all the way to the field oxide regions, then the third doped region could conceivably avoid edge exposure without extending under the field oxide region at all, a result which would lead to an absurd definition of "appreciably under." In order to "assure" avoidance of edge exposure, however, the patent requires that the third doped region extend far enough under the field oxide regions to prevent exposure even under the maximum possible extent of the thin region. The Court's adoption of plaintiff's construction of "appreciably under" is thus not inconsistent with plaintiff's suggestion that the thin region need not extend the entire width of the channel.

The specification supports plaintiff's construction. It states that the thin region is "preferably formed in the shape of a square or a rectangular slot. Where a rectangular slot is used which extends into field oxide regions 13, some control over etching it must be taken to keep the area small and to avoid edge problems with implanted region 33." '776 patent, 5 :63-66. This passage indicates that the thin region may be in the shape of a square that does not extend the full width of the channel. Given that the claim language does not support defendant's construction, and that the specification supports plaintiff's, the Court holds that the patent does not require that the thin portion of the third insulating layer extend all the way to the edges of the channel.

In the joint claim construction statement, defendant also asserted that several other limitations were contained in the claim: that the first insulating region be made of dielectric material, that the substrate be a silicon substrate, that the first layer be coextensive with the floating gate, and that the passage of charge carriers occur through the Fowler-Nordheim effect. Defendant did not advance arguments for these proposed limitations in its briefs, and the Court declines to adopt them.

J. "edges defining the sides"

[22] [23] The '776 patent requires "field stop regions in said substrate having edges defining the sides of said channel." '776 patent, 12 :56-57. Solely on the basis of extrinsic expert declarations, defendant argues that the term "edge" means "the point at which conduction would be stopped." In the absence of ambiguity or confusion about the meaning of the term, such reliance on extrinsic evidence is improper. *See Vitronics*, 90 F.3d at 1584. The Court does not believe the term "edge" is ambiguous and holds that it has its ordinary spatial meaning of "the line where an object or area begins or ends." Webster's Ninth New Collegiate Dictionary 396 (1984).

III. Construction of the '750 Patent

The '750 patent claims a process for manufacturing EEPROMs. Generally speaking, such chips are manufactured through a series of steps of masking and treating, and depositing new layers on a silicone substrate. The new process sought to improve the prior art by altering the order in which some of the steps had been traditionally performed. By changing the order, the designers hoped to be able to construct memory devices that were less sensitive to small variations in production, and so could be mass-produced more effectively.

The '750 patent claims:

1. A process for fabricating a nonvolatile MOS memory device including the steps of: first defining and doping a tunneling diffusion region in a semiconductor substrate,

forming four opposed field oxide regions to define a four-sided active field effect transistor region in an area on said substrate which includes said tunneling diffusion region such that said tunneling diffusion region lies appreciably under the edges of two opposing ones of said field oxide regions,

forming a first layer of dielectric material on top of said active field effect transistor regions, having a relatively thin portion therein disposed entirely over said tunneling diffusion region,

forming a first gate electrode on top of said first layer of dielectric material, extending entirely over said thin portion,

forming a second layer of dielectric material over and around said first gate electrode to electrically insulate said first gate electrode,

forming a second gate electrode on top of said second layer of dielectric material, disposed entirely over said first gate electrode,

forming source and drain regions in said active field effect transistor region at locations such that said tunneling diffusion region is in physical contact with said drain region and said tunneling diffusion region lies along the length of a channel formed by said source and drain regions.

A. "a tunneling diffusion region"

[24] The parties dispute whether the patent covers a process in which more than one tunneling diffusion region is defined and doped. Plaintiff argues that because the method patent contains the transitional phrase "including the steps of," '750 patent, 12 :50, the claim cannot be limited to a single tunneling diffusion region. It is true that a patent with such inclusive transitional language can cover processes with additional steps. *See* *Moleculon Research Corp. v. CBS, Inc.*, 793 F.2d 1261, 1271 (Fed.Cir.1986). For its part, defendant argues that the claim's singular reference to "a" tunneling diffusion region, and its later reference to "said" region, require that there be only a single such region.

Defendant cites *Abtox, Inc. v. Exitron Corp.*, 122 F.3d 1019, 1024, *amended on other grounds*, 131 F.3d 1009 (Fed.Cir.1997), and *Insituform Tech., Inc. v. Cat Contracting, Inc.*, 99 F.3d 1098 (Fed.Cir.1996), *cert. denied*, 520 U.S. 1198, 117 S.Ct. 1555, 137 L.Ed.2d 703 (1997). These cases both addressed the issue of whether a patent covered devices with only a single structure or region, or multiple such structures. In both cases the Federal Circuit first noted that the claims referred to the structure or region in the singular: "a chamber" and "said chamber" in *Abtox* and "a cup" in *Insituform*. Likewise, the claim language in this case refers to "a tunneling diffusion region" and "said tunneling diffusion region." In *Abtox* and *Insituform*, the Federal Circuit then noted that the specifications confirmed the singular reading of the claim language, for they described only a single chamber and cup, respectively. *Abtox* at 1024; *Insituform* at 1106. In this case, by contrast, the specification makes clear that the patent contemplates multiple tunneling diffusion regions, formed at different times. The specification states that "tunnel implant region 33 may consist of two

segments, 33a and 33b ... Region 33b, however, may be formed later in the process sequence." '750 patent, 10 :9-17. *Abtox* and *Insituform* are thus distinguishable. In light of the specification, and noting that the article "a" can mean "one or more," *see Abtox* at 1023, the Court holds that the '750 patent is not limited to processes that create only a single tunneling diffusion region.

B. "forming source and drain regions"

[25] The patent lists seven steps in its process. The first step begins "first forming ..." All the following steps begin simply "forming ..." The seventh and final listed step reads "forming source and drain regions in said active field effect transistor region at locations such that said tunneling diffusion region is in physical contact with said drain region ..." Defendant argues that this step must occur last; plaintiff asserts that it need not occur last, so long as it follows the steps in which the active field effect transistor region and the tunneling diffusion region are formed.

[26] The parties have cited no case requiring that the steps in a process patent must occur in the order in which they are listed. Nevertheless, "[p]redominant language norms suggest recounting process steps in a chronological sequence. A process description flows most naturally from one step in the sequence to the next in chronological order." *Loral Fairchild Corp. v. Victor Co. of Japan*, 906 F.Supp. 798 (E.D.N.Y.1995). Although *Loral Fairchild* is not binding precedent, the Court believes it appropriate to begin with the presumption that the steps occur in their listed order.

The claim language and the specification of '750 patent, however, overcome this presumption. A close reading of the seven steps supports plaintiff's construction. The step labeled "first" must obviously occur first. The ordering of steps two through six FN7 is established by language in each step that requires it to occur after the step preceding it in the claim. The second step requires field oxide regions to be placed on top of the tunneling diffusion region formed in the first step; the third step requires a layer of dielectric material to be placed on top of the active field effect transistor region defined in the second step; and so on in sequence through the sixth step. The seventh step, however, is different. It refers only to the tunneling diffusion region and the active field region formed in the first and second steps. The pronounced break in the pattern is significant, and suggests that the seventh step is only required to follow the first two steps.

FN7. Although the claim does not number the steps, the Court will do so for ease of reference.

The specification buttresses this reading. It notes that if the embodiment depicted in Figure 5 is being practiced, the formation of the drain (the seventh step) will occur after the definition of the floating gate (the fourth step) and before the addition of the programming gate (the sixth step). '750 patent, 10 :44-51. Defendant's position that the source and drain must be formed last would make impossible this embodiment. The Court therefore holds that the '750 patent requires only that the source and drain be doped after the formation of the tunneling diffusion region and the four opposed field oxide regions.

C. "edges"

The '750 patent requires the tunneling diffusion region to lie "appreciably under the edges of two opposing ones of said field oxide regions." '750 patent, 12:57-58. Defendant proposes the same construction of the word "edge" that it does for the '776 patent. The Court instead construes "edge" to have the same meaning it assigned it in the '776 patent.

D. "source and drain regions"

[27] The parties appear to agree that in the '750 patent, the source and drain regions are not interchangeable. This is consistent with the claim language, which requires that the tunneling diffusion region be in "physical contact with said drain region." '750 patent, 14 :1-2. The Court so holds.

Defendant also proposes that the '750 patent requires the tunneling diffusion region to be formed "separately" from the source and drain. Defendant apparently uses that term "separately" to mean "at a different time from" rather than "in a different place from." As discussed above, the Court agrees that the '750 patent requires the tunneling diffusion region to be formed before the source and drain regions.

E. "a first layer of dielectric material"

The parties raise the same arguments regarding the construction of this term that they did regarding the construction of the term "first insulating layer" in the '776 patent. The Court adopts the same conclusions that it did regarding these issues in the '776 patent.

F. "disposed entirely over"

[28] The '750 patent requires "a second gate electrode ... disposed entirely over said first gate electrode." '750 patent, 13 :1-3. The parties have raised the same arguments as with the "disposed above" term of the '776 patent. The addition of the term "entirely" in this patent, however, requires that the phrase be construed differently. If the upper gate electrode overhangs the lower gate electrode, it is not "entirely over" in the normal meaning of that phrase. The Court holds that the '750 patent requires that the second gate electrode must be located above the first gate, and that no portion of the second gate electrode may extend horizontally beyond the edge of the first gate electrode.

G. "appreciably under"

Because the parties advance the same arguments as in the '776 patent, and because of the rule that identical claim terms in related patents should be consistently construed, *see* *Abtox v. Exitron Corp.*, 122 F.3d 1019, *amended* 131 F.3d 1009, 1010 (Fed.Cir.1997), the Court construes this term to have the same meaning as in the '776 patent.

H. "MOS Memory Device"

[29] Although the claim language of the '750 patent does not refer to a "memory cell," it uses the term "MOS memory device." The parties raise the same arguments as in the '776 patent about whether the device so claimed must include only a single select and memory device, or can include multiple select and memory devices. The '750 patent is different because the requirement that there be four opposed field oxide regions makes impossible mirror cells, which as defined in the '776 patent contain field oxides only at the two channel sides. The unavailability of mirror cells, however, does not require a new definition of memory cell. For the other reasons that supported its construction of "memory cell" in the '776 patent, the Court holds that "MOS memory device" refers to a cell with only a single select and memory device.

IV. Construction of the '811 Patent

The '811 patent relates to a memory chip's peripheral circuitry, which is used to access and alter the contents

of the individual memory cells. Those individual memory cells are connected to each other and to the peripheral circuitry by "lines" along which electrical current runs. The patent describes a "charge pump circuit" that is able to take the standard voltage current coming into the memory chip, amplify it to a higher voltage, and selectively run that higher current down certain lines.

The '811 patent claims:

An apparatus for selectively increasing the voltage on one or more of a plurality of conductive lines having inherent distributed capacitance disposed in a semiconductor circuit comprising:

means disposed on said semiconductor circuit for selecting one or more of said conductive lines;

high voltage generating means disposed on said semiconductor circuit for generating a high voltage from a lower voltage power supply connected to said semiconductor circuit;

voltage pulse generating means disposed on said semiconductor circuit for generating voltage pulses;

means for capacitively coupling voltage pulses from said voltage pulse generating means to a voltage node in said semiconductor circuit;

transfer means responsive to said selecting means and connected to said voltage node for transferring increments of charge from said high voltage generating means to the inherent distributed capacitance in selected ones of said conductive lines in response to said voltage pulses;

said transfer means including switching means cooperating with said selecting means for blocking substantially all of the flow of current through and transfer of charge from said high voltage generating means to said conductive lines which are unselected.

'811 patent, 8:17-45.

A. "a plurality of conductive lines having inherent distributed capacitance"

[30] The '811 patent claim mentions "conductive lines" several times. Defendant contends that the term refers only to word lines in memory arrays; plaintiff asserts that it can also refer to any line capable of conducting current. In determining the meaning of "conductive lines," the Court will not apply section 112, para. 6 because "conductive lines" are not the structure corresponding to the selecting, voltage pulse generating, transfer, or switching means. Rather, the Court is guided by normal principles of claim construction. Perceiving no "ordinary or accustomed meaning" of "conductive lines," *see Wolverine World Wide*, 38 F.3d at 1196, the Court turns to the specification, which supports plaintiff's broader construction. It states that:

[A]lthough this disclosure has been made with reference to raising the voltage on a word line in a memory array, those skilled in the art in the art will recognize that other lines, such as y-lines, select lines and write lines may be pumped up to higher voltages by use of this invention.

'811 Patent, 7:28-31. Figure 4 of the specification, moreover, shows the charge pump circuits connected not only to word lines, but also to y-lines, write lines, and a sense line. '811 Patent, Fig. 4, 7:42-8:3.

Defendant argues that the phrase "conductive lines having inherent distributed capacitance," incorporated into the claim from the preamble, requires "conductive lines" to be construed as "word lines." According to this argument, capacitance is only "distributed" if it results from contact with transistors evenly spaced along the line; word lines are the only kind of conductive lines that have evenly spaced transistors. Because the specification defines the meaning of "conductive lines," however, the Court may not consider defendant's extrinsic evidence about the meaning of "distributed capacitance" and the spacing of transistors along various kinds of lines. *See Vitronics*, 90 F.3d at 1584. Accordingly, the Court holds that "conductive lines" refers not only to x-lines, but also to other lines that conduct current.

The parties agree that the term "plurality" means "two or more." Noting that this is the common meaning of the word, *see York Products, Inc. v. Central Tractor Farm & Family Center*, 99 F.3d 1568, 1575 (Fed.Cir.1996), the Court adopts the parties' construction.

B. "means ... for selecting one or more of said conductive lines"

1. Corresponding Structure

[31] [32] The parties first dispute what structure corresponds to the "selecting means." In means-plus-function claims, the applicant is limited to the structure disclosed in the specification that corresponds to the claimed means. *See Valmont Indus. v. Reinke Mfg. Co.*, 983 F.2d 1039, 1042 (Fed.Cir.1993). In this case, the specification describes the selection of a line through the use of a pre-decoder and a post-decoder labeled as 10 and 20 in Figures 1 and 2 of the specification. The figures depict the internal circuitry of the decoders.

Plaintiff argues that the selection means should not be limited to decoders 10 and 20 because the specification text permits the use of "conventional multiple level decoding circuitry." '811 Patent, 3:54. Plaintiff contends that under *Serrano v. Telular Corp.*, 111 F.3d 1578 (Fed.Cir.1997), the general description in the text supersedes the example in the figure. Plaintiff's argument is misplaced for two reasons. First, the reference to "the art in conventional multiple level decoding circuitry," taken in context, does not state that any decoders known in the art may be used, but rather states that one skilled in that art would recognize that control signals from different x-lines are sent to the pre-decoder and the post-decoder. '811 Patent 3 :51-58. Second, *Serrano* is inapposite because in that case the particular alternative structure was specifically named in the text. *Id.* at 1583 (invention could use "a microprocessor based system" as well as "discrete logical circuitry"). Here, by contrast, the specification text does not describe any particular alternative structure. Allowing the structure to be any "multiple level decoding circuitry" known in the art would not provide readers of the patent with adequate notice of the invention's scope, and would be contrary to the claim limitation purpose expressed in 35 U.S.C. s. 112, para. 6.

Plaintiff also argues that Figure 4 depicts two different selection means, labeled as "X-Decoders 124" and "Y-Decoders 126." Those diagrams, however, do not depict any internal circuitry, and so provide no information about the particular structure of the decoders. Nor is it apparent from the specification whether or how "X-Decoders" and "Y-Decoders" correspond to "Pre-Decoders" and "Post-Decoders." Accordingly, the Court holds that the '811 patent requires the use of pre-decoder 10 and post-decoder 20 as depicted in Figures 1 and 2.

2. Meaning of "selecting"

[33] The parties also dispute the meaning of "selecting" a conductive line. Defendant argues that "selecting" means bringing the line from a logical low to a logical high voltage; plaintiff argues that it means floating the line at some voltage. Section 112, para. 6 does not apply to this dispute because it concerns not a structure, but rather a function.

The specification does not resolve the parties' dispute. Consistently with defendant's construction, the specification states that when a line has been selected, "it sits at approximately Vcc [a logical high voltage]." '811 Patent, 5:45. The specification also indicates, however, that the line is floated: "During programming word line 8 is dynamically at Vcc; there is no active voltage source holding it at Vcc since device 22 is turned off." '811 patent, 5 :51-53.

The Court therefore turns to the expert testimony presented at the *Markman* hearing. Plaintiff's expert, Mr. Callahan, testified that "selecting" a line simply means to identify it for future action. According to his view, floating a line could select it if none of the other lines were floated. Mr. Callahan, however, provided no examples of any circuit in which a line was selected merely by being floated; defendant's expert, Dr. Fellman, refused to admit on cross examination that such a device was possible. The Court agrees with defendant that merely floating a line does not select it.

The Court does not believe, however, that in the context of the '811 patent, "selecting" necessarily means driving a line to a logical high voltage, as defendant argues. Dr. Fellman himself testified that one skilled in the art would understand "selecting" a line to mean driving it to a voltage that activates a device to which the line is connected. In the context of the '811 patent, this means driving the line to a voltage high enough to activate the transfer means. Adopting this more general definition of selecting is consistent with the principle that where section 112, para. 6 does not apply, a claim should not be limited to the examples used in the specification. *See Electro Med. Sys. v. Cooper Life Sciences*, 34 F.3d 1048, 1054 (Fed.Cir.1994).

The issue remains whether "selecting" also means floating the line once it has been driven to the level that activates the transfer means. The parties agree that the line must be floated to be able to be pumped up to a higher voltage, and that the post-decoder described in the specification is the device that causes the line to float. *See* '811 patent, 5 :51-53. Floating the line is thus an integral part of what the selection means does; no other structure described in the patent performs that function. Accordingly, the Court holds that "selecting" is used in the '811 patent to mean driving a line to a voltage that activates the transfer means and then floating it.

The parties also dispute whether "selecting" means that all lines can be selected at the same time. Plaintiff argues that they can; defendant maintains that some lines must remain unselected. Defendant first cites a dictionary definition of "select" as "to choose from among several: pick out." That definition, however, does not preclude "selecting" from meaning choosing every item from a set. The claim, moreover, explicitly states that the invention selects "one or more" lines. The applicant was plainly aware of the issue of multiple selection; having specified that more than one line could be selected, his failure to specify that less than all had to be selected appears to have been a conscious decision. Defendant also argues that the patent refers to action on both selected and unselected lines. The Court agrees with plaintiff, however, that nothing in the patent requires that there must simultaneously be some lines that are selected and others that are unselected. The Court therefore holds that in the '811 patent, the meaning of "selecting" includes selecting all lines simultaneously.

C. "high voltage generating means"

[34] [35] [36] The parties dispute what structure corresponds to a "high voltage generating means." The first issue is whether this paragraph is governed by section 112, para. 6. The claim limitation rule of that code section applies only when the claim element does "not recite a definite structure." *Cole v. Kimberly-Clark Corp.*, 102 F.3d 524, 531 (Fed.Cir.1996) ("perforation means extending from the leg band means to the waist band means" held sufficiently definite to avoid means-plus-function analysis), *cert denied*, 522 U.S. 812, 118 S.Ct. 56, 139 L.Ed.2d 20 (1997). On the other hand, the "recitation of some structure in a means plus function element does not preclude the applicability of section 112, para. 6." *Laitram Corp. v. Rexnord, Inc.*, 939 F.2d 1533, 1536 (Fed.Cir.1991). In this case, section 112, para. 6 does apply because the phrase "high voltage generating means" simply describes what the means does, and does not describe any definite structure. *See id.* (where a recited structure tells only what a means does, section 112, para. 6 applies).

[37] The specification states that "the present invention may include high-voltage generator circuit 34. Known circuit techniques are used to implement high-voltage circuit 34. See On-Chip High Voltage Generation in NMOS Integrated Circuits Using an Improved Voltage Multiplier Technique, IEEE Journal of Solid State Circuits, Vol SC-11, No. 3, June 1976 [the "Dickson Article"]." '811 patent, 4:56-64. The high-voltage generator circuit is included in Figures 2 and 4, but is depicted only as a "black box" (that is, the internal construction of the circuit is not diagramed).

Plaintiff asserts that the reference to "known circuit techniques" means that the generating means can be any high-voltage generator circuit implemented by such techniques. The Court disagrees. The phrasing of the specification implies that the "known circuit techniques" are those described in the Dickson article, and no others; had the drafter meant something broader, the specification would have been phrased in a manner such as "techniques including those in the Dickson article" or "See, for example, the Dickson article." Even if "known circuit techniques" was intended to refer to circuits made with techniques beyond those in the Dickson article, the specification does not describe any such circuit with enough specificity to qualify as the claimed means. *See Fonar Corp. v. General Elec. Co.*, 107 F.3d 1543, 1551 (Fed.Cir.), *cert. denied*, 522 U.S. 908, 118 S.Ct. 266, 139 L.Ed.2d 192 (1997) (where specification described "generic gradient wave form generator" and stated that other wave forms could be used but did not specifically identify them, means-plus-function claim was limited to generic gradient wave form).

It thus appears that the structure corresponding to the high voltage generating means cannot be any circuits beyond those described in the Dickson article. In its motion for summary judgment of indefiniteness, defendant asserts that the Dickson circuits are also forbidden because the structure corresponding to a means in a section 112, para. 6 claim cannot be described by reference to a non-patent document. The Court requests further briefing on this issue before it will construe the high voltage generating means.

D. "voltage pulse generating means"

[38] The specification states that oscillator 38 in Figure 2

"may be implemented as a ring oscillator or by other means known in the art. The output of oscillator 38 is a square wave varying between zero volts and Vcc having finite rise/fall times and a frequency in the range of several hundred KHz to 10 MHz, the higher frequencies being preferred."

'811 patent, 5:2-8. Because this paragraph, like the preceding one, is expressed in means-plus-function format, the Court holds that the claim is limited to the particular structure disclosed in the specification. The general mention of "other means known in the art" is not sufficient to broaden the scope of the claim. *See*

E. "means for capacitively coupling"

[39] The parties agree that the "means for capacitively coupling voltage pulses from said voltage pulse generating means to a voltage node in said semiconductor circuit" corresponds to device 44 in Figure 2 of the '811 patent. Defendant attempts to argue that the function of device 44 necessarily requires additional limitations: that it is arranged as a voltage variable capacitor, with one terminal connected to a voltage node and one terminal connected to the voltage pulse generating means, and which does not provide a direct current path between the voltage pulse generating means and voltage node. Defendant offers no intrinsic evidence to support these additional limitations, however, relying solely on the opinion of its expert. The Court sees no reason why those limitations should be read into the patent, and holds only that the "means for capacitively coupling" refers to device 44 of the specification.

The parties also dispute whether device 44 must be an enhancement transistor or may also be a native transistor. The specification states that "device 44, shown as an enhancement device, may be a native device." '811 patent, 7:23-25. Given that unambiguous statement in the specification, the Court will not consider the opinion of defendant's expert that the device would not work with a native transistor, for that is extrinsic evidence. The Court holds that device 44 may be either a native or an enhancement transistor.

F. "substantially all" and "switching means"

The parties dispute the meaning of the related terms "substantially all" and "switching means." According to the claim language, the switching means must (1) be included in the transfer means and (2) cooperate with the selecting means to block "substantially all of the flow of current" from the high voltage generating means to unselected lines. '811 patent, 8:40-45.

[40] The Court first construes the term "substantially all." Defendant urges the Court to hold that "substantially all" is indefinite. As support for its indefiniteness argument, defendant relies upon *Amgen, Inc. v. Chugai Pharmaceutical Co.*, 927 F.2d 1200 (Fed.Cir.1991), a case in which the Federal Circuit upheld a finding of indefiniteness for a patent that claimed a pharmaceutical product with a potency of "at least about 160,000" units. Defendant argues that the term "substantially all" is likewise a term of measurement that provides insufficient information about the range of values it encompasses. *Amgen v. Chugai Pharmaceutical*, however, is distinguishable. In that case, the Federal Circuit emphasized the fact that products with a potency of about 120,000 units were known in the prior art. *Id.* at 1217-18. The court explained that when the meaning of claims is in doubt, it is proper to invalidate them "especially when, as is the case here, there is close prior art." *Id.* at 1218. In this case, by contrast, defendant cites deposition testimony that the '811 patent reduced current leakage over the prior art by "perhaps a factor of 100 to 1,000." (Def.'s Mot. For Summ. J. of Indefiniteness at 12 (testimony of Pl.'s expert, Mr. Callahan)). Given the vast difference between the '811 patent and the prior art in this respect, slight uncertainty about the precise meaning of "substantially" is less important than was the ambiguity in *Amgen v. Chugai Pharmaceutical*. For this reason, the Court holds that the term is not indefinite.

As an alternative position, defendant argues that "substantially all" means the amount of current blocked by the particular combination of devices 40 and 46, the devices it maintains constitute the switching means. Plaintiff contends that the term should be given its normal meaning of "all but an insignificant amount." Seeing no reason why the term should be given any other, out-of-the-ordinary meaning, the Court adopts plaintiff's construction.

[41] The parties also dispute the meaning of the term "switching means." Defendant asserts that it refers to devices 40 and 46 of the specification; plaintiff asserts that it refers to device 46 only. Intrinsic evidence is insufficient to define the term. "Switching means" has no common meaning apart from the patent. The specification does not use the term. Nor does the prosecution history offer helpful guidance. Defendant argues that in the prosecution of the patent, the applicant distinguished the claim from a prior device that had only a single transistor in its switching means, thus disavowing any claim to a device with a single-transistor switching means. The Court is persuaded, however, by plaintiff's response that the means in the distinguished device was not intended to block leakage current, the function of the switching means in the '811 patent.

The Court therefore turns to extrinsic evidence. At the Markman hearing, the parties' experts presented essentially consistent testimony about how devices 40 and 46 function when conductive line 8 is in the unselected state of about zero volts. The roles of the two devices in that situation depend on the threshold voltage of device 40. The specification describes device 40 as a native transistor with a threshold voltage of about zero volts. '811 patent, 5:20-21. If it is formed this way, device 40 will block most of the current flowing from the high voltage generating means when line 8 is unselected. The small amount of current that leaks through will be too low to open device 46, causing device 46 to block the remaining current from reaching line 8. Device 46 will thus function, in the words of plaintiff's expert, as a "backstop." The specification also says that device 40 can be an enhancement transistor. '811 patent, 7:21-22. If device 40 is formed this way, and has a threshold voltage of approximately one volt, it will block all the current flowing from the high voltage generating means. Device 46 will remain closed, but will not block any current because none will reach it.

This testimony about current blockage indicates that devices 40 and 46 are both part of the switching means. In the native transistor configuration, the two devices work together to block substantially all the flow. In the enhancement transistor configuration, device 40 alone blocks the flow. Under neither configuration is it accurate to say that device 46 alone blocks substantially all the flow. Plaintiff's proposed construction is thus untenable. In fact, if a single device were to serve as the switching means, device 40 would be the better candidate, for it comes closer to blocking "substantially all" of the current than does device 46. The Court does not hold that device 40 alone is the switching means, however, for two reasons. First, neither party has advanced that construction. Second, although device 40 blocks most or all of the current, no evidence was presented that the amount of current that passes device 40 in the native device configuration is so small as to be insignificant. To the contrary, the presence of device 46 as a backstop indicates that the amount of current that passes device 40 is significant. Defendant's proposed construction is therefore the one that best satisfies the claim requirement that the switching means block "substantially all" the flow.

Defendant's construction, moreover, is consistent with the claim requirement that the switching means cooperate with the selecting means. Device 40 cooperates with the selecting means in the sense that the selected or unselected state of the conductive line determines whether device 40 is on or off. Both devices 40 and 46 cooperate with the selecting means because they sometimes allow current to pass to from the high voltage generating means to the selected line. It thus is not correct to argue, as plaintiff does, that device 46 alone cooperates with the selecting means. Accordingly, the Court adopts defendant's construction and holds that the term "switching means" refers to devices 40 and 46 of the specification.

G. "transfer means"

[42] The '811 patent claims a "transfer means responsive to said selecting means and connected to said voltage node for transferring increments of charge from said high voltage generating means to the inherent distributed capacitance in selected ones of said conductive lines in response to said voltage pulses." '811 patent, 8:34-39. The transfer means must include the switching means. '811 patent, 8:40. The parties agree that this latter limitation requires the transfer means to include at least one device beyond what is in the switching means, so that the two claim terms are not redundant. The parties disagree, however, about what that additional device is. Plaintiff asserts that the transfer means is made up of devices 40 and 46 of the switching means, a construction that is made impossible by the Court's holding that devices 40 and 46 are the switching means.

The only question, then, is whether device 50 may be part of the transfer means, as defendant asserts. Plaintiff argues that it cannot because the specification states that the use of device 50 is "optional." '811 patent, 7:20-21. The Court disagrees. As discussed above, a means-plus-function claim is limited to the structure disclosed in the specification; a general mention of a possible alternative structure cannot expand the scope of the claim. *See Valmont Industries, Inc. v. Reinke Manufacturing Co.*, 983 F.2d 1039, 1042 (Fed.Cir.1993); *Fonar Corp. v. General Elec. Co.*, 107 F.3d 1543, 1551 (Fed.Cir.), *cert. denied*, 522 U.S. 908, 118 S.Ct. 266, 139 L.Ed.2d 192 (1997). The parties have not cited, and the Court has not found, any case discussing how this principle should apply to structural elements described in the specification as "optional." The case cited by defendant, *Davies v. United States*, 31 Fed.Cl. 769, 35 U.S.P.Q.2d 1027 (Fed.Cl.1994), is different because it involved patent language suggesting that a structure was not required to perform a particular function, not that the structure itself was optional. *See id.*, 35 U.S.P.Q.2d at 1034. Moreover, in deciding that the structure did have to perform the function, the Court of Federal Claims noted that the optional language had originally related to a dependent claim, and had not been amended when that claim was severed. *Id.* Because neither *Davies* nor any other case indicates that special claim construction principles should govern the analysis of "optional" claim elements, the Court applies the normal principles of section 112, para. 6.

Given the claim language, some structure must exist that is part of the transfer means but not part of the switching means. Only device 50 fits that bill. If it were absent, some other, undescribed structure would have to take its place, a result that would be inappropriate under the claim limitation rationale of section 112, para. 6, and that would not provide claim readers with adequate notice about the patent's scope. The Court therefore holds that despite the language of the specification, device 50 is not optional.FN8 Together with devices 40 and 46, it forms the transfer means.

FN8. The Court's analysis of this issue is not inconsistent with its analysis of the optional third doped region 33a in the '776 patent because the '776 patent is not governed by section 112, para. 6.

V. Defendant's Indefiniteness Motion

In its motion for summary judgment of indefiniteness, defendant asserted that three terms are indefinite: "substantially all" in the '811 patent, "appreciably under" in the '750 and '776 patents, and "high voltage generating means" in the '811 patent. Because the Court has construed "substantially all" and "appreciably under," defendant's motion is DENIED with regard to those issues. The Court requests further briefing, however, on the issue addressed in section V.B.2 of defendant's motion: whether the reference to the Dickson article is legally adequate to disclose a structure corresponding to the high voltage generating means in the '811 patent.

VI. Cross-Motions to Strike

Because the Court, in reaching the conclusions in this order, has not relied upon any part of the declarations challenged in the parties' cross-motions to strike, those motions are DENIED.

CONCLUSION

For the reasons described, the Court construes the '776, '750, and '811 patents as set forth above. The parties' cross-motions to strike are DENIED. Defendant's motion for summary judgment of indefiniteness is DENIED as to the terms "substantially all" and "appreciably under," and is TAKEN UNDER SUBMISSION as to the term "high voltage generating means." Plaintiff is ORDERED to file an opposition brief of no more than five pages on the issue addressed in section V.B.2 of defendant's indefiniteness motion within *ten days* of the date of this order; defendant may file a reply brief of no more than three pages within *five days* of the filing date of plaintiff's opposition.

SO ORDERED.

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