

United States Court of Appeals for the Federal Circuit

SAMSUNG ELECTRONICS CO., LTD., MICRON
TECHNOLOGY, INC., SK HYNIX INC.,
Appellants

v.

ELM 3DS INNOVATIONS, LLC,
Appellee

2017-2474, 2017-2475, 2017-2476, 2017-2478, 2017-2479,
2017-2480, 2017-2482, 2017-2483, 2018-1050, 2018-1079,
2018-1080, 2018-1081, 2018-1082

Appeals from the United States Patent and Trademark
Office, Patent Trial and Appeal Board in Nos. IPR2016-
00386, IPR2016-00387, IPR2016-00388, IPR2016-00390,
IPR2016-00391, IPR2016-00393, IPR2016-00394,
IPR2016-00395, IPR2016-00687, IPR2016-00691,
IPR2016-00708, IPR2016-00770, IPR2016-00786.

Decided: June 12, 2019

RUFFIN B. CORDELL, Fish & Richardson PC, Washing-
ton, DC, argued for all appellants. Appellants Micron
Technology, Inc., SK Hynix Inc. also represented by
CHRISTOPHER DRYER, TIMOTHY W. RIFFE, ROBERT ANDREW
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LLC

NAVEEN MODI, Paul Hastings LLP, Washington, DC,
for appellant Samsung Electronics Co., Ltd. Also repre-
sented by PHILLIP W. CITROEN, ALLAN SOOBERT.

WILLIAM MEUNIER, Mintz, Levin, Cohn, Ferris, Glovsky
and Popeo, P.C., Boston, MA, argued for appellee. Also rep-
resented by KEVIN AMENDT, SANDRA BADIN, MATTHEW
STEPHEN GALICA, MICHAEL NEWMAN, MICHAEL TIMOTHY
RENAUD, JAMES M. WODARSKI.

Before MOORE, REYNA, and CHEN, *Circuit Judges*.

MOORE, *Circuit Judge*.

Samsung Electronics Co., Ltd., Micron Technology, Inc., and SK Hynix Inc. (collectively, “Petitioners”) appeal from the final written decisions of the Patent Trial and Appeal Board in thirteen inter partes reviews holding that they did not establish the unpatentability of 105 claims across eleven patents (“Challenged Patents”). Given that each challenged claim requires a low-tensile-stress dielectric, and substantial evidence supports the Board’s finding that a person of ordinary skill in the art would not have reasonably expected success in combining the prior art to meet this limitation, we affirm.

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BACKGROUND

Appellee Elm 3DS Innovations LLC (“Elm”) is the owner of the Challenged Patents,¹ which share a specification and all relate to “stacked integrated circuit memory.”² ’672 patent at 1:7–8. The Challenged Patents are the subject of co-pending litigation between Elm and Petitioners.

The Board instituted inter partes review based on thirteen petitions filed by Petitioners. Among others not at issue on appeal, the petitions challenged the following claims: claims 17–18, 22, 84, 95, 129–32, 145–46, and 152 of the ’672 patent (IPR2016-00386); claims 1–2, 8, 14, 31–32, 44, 46, and 52–54 of the ’778 patent (IPR2016-00387); claims 10–12, 18–20, 60–63, 67, 70–73, and 77 of the ’239 patent (IPR2016-00388 and IPR2016-00393); claims 1–3, 30–31, 33, 40–41, and 44 of the ’542 patent (IPR2016-00390); claims 30, 34, 36, 135–138, and 147 of the ’862 patent (IPR2016-00391); claims 36 and 51 of the ’617 patent (IPR2016-00394); claims 1, 10–11, and 13–14 of the ’732 patent (IPR2016-00395); claims 1, 7, 17–18, and 33 of the ’119 patent (IPR2016-00687); claims 1 and 20–23 of the ’004 patent (IPR2016-00691); claims 1, 12–13, 24, 36–38, 53, 83, 86–87, and 132 of the ’499 patent (IPR2016-00708 and IPR2016-00770); and claims 58, 60–61, and 67 of the ’570 patent (IPR2016-00786). Each ground challenging the claims was based on obviousness and asserted either U.S. Patent No. 5,202,754 (“Bertin”) or a 1996 article by Kee-Ho Yu, et. al., titled “Real-Time Microvision System with Three-Dimensional Integration Structure” (“Yu”) as the

¹ The patents at issue are U.S. Patent Nos. 8,653,672; 8,841,778; 7,193,239; 8,629,542; 8,796,862; 8,410,617; 7,504,732; 8,928,119; 7,474,004; 8,907,499; and 8,933,570.

² For simplicity, this opinion cites only to the specification of the ’672 patent.

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primary reference in combination with, relevant here, U.S. Patent No. 5,354,695 (“Leedy”).³

The Board held that Petitioners had not met their burden of demonstrating that the claims were unpatentable. Specifically, it found that the prior art did not disclose the “substantially flexible” limitation. It also found that Petitioners did not demonstrate a motivation to combine Bertin or Yu with Leedy or a reasonable expectation of success in doing so. Petitioners timely filed notices of appeal, and the appeals were consolidated. We have jurisdiction pursuant to 28 U.S.C. § 1295(a)(4)(A).

DISCUSSION

I. Claim Construction

“We review the Board’s constructions based on intrinsic evidence de novo and its factual findings based on extrinsic evidence for substantial evidence.” *HTC Corp. v. Cellular Commc’ns Equip., LLC*, 877 F.3d 1361, 1367 (Fed. Cir. 2017). The Board construes claims in an unexpired patent according to their broadest reasonable interpretation in light of the specification. 37 C.F.R. § 42.100(b) (2017).⁴ Claims of an expired patent are construed according to the standard applied by district courts. *See In re CSB-Sys. Int’l, Inc.*, 832 F.3d 1335, 1341 (Fed. Cir. 2016) (referencing *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed.

³ Claim 1 of the ’499 patent was challenged based on U.S. Patent No. 5,731,945, which contains the same disclosure as Bertin and adds details not relevant to this appeal.

⁴ The Board’s decisions issued prior to the effective date of the U.S. Patent and Trademark Office’s change to the claim construction standard applied in inter partes review. *See Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board*, 83 Fed. Reg. 51,340 (Oct. 11, 2018).

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Cir. 2005) (en banc)). While some patents were expired at the time of the Board's final written decision and others were not, the parties agree that the different claim construction standards do not impact the outcome. Appellants' Br. 44; Appellee's Br. 41. The parties have not contested the Board's application of the *Phillips* claim construction standard.

All challenged claims except for claims 1 and 14 of the '778 patent use "substantially flexible" in at least one of two ways. The first is to modify the term "semiconductor substrate." Claim 129 of the '672 patent illustrates the use in this context (emphasis added):

An integrated circuit structure comprising:

a first substrate comprising a first surface supporting interconnect contacts;

a substantially flexible semiconductor second substrate comprising a first surface and a second surface at least one of which supports interconnect contacts, wherein the second surface is opposite the first surface and wherein the second surface of the second substrate is formed by removal of semiconductor material from the second substrate and is smoothed or polished after removal of the semiconductor material; and

conductive paths between the interconnect contacts supported by the first surface of the first substrate and of the interconnect contacts supported by the second substrate;

wherein the first substrate and the second substrate overlap fully or partially in a stacked relationship; and

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