

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

QORVO, INC.,

Petitioner,

v.

CORNELL RESEARCH FOUNDATION, INC.,

Patent Owner.

Case No. IPR2024-00758

U.S. Patent No. 7,250,360

**PETITIONER'S REPLY TO
PATENT OWNER'S PRELIMINARY RESPONSE¹**

¹ This Reply was authorized by Board's September 17, 2024 Order (Paper No. 9).

Petitioner's Reply to Patent Owner's Preliminary Response

EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 7,250,360 to Shealy et al. ("360 patent")
1002	'360 Patent Prosecution History (U.S. Application No. 11/069,040)
1003	Declaration of Dr. Stan Shanfield
1004	U.S. Patent Application Pub. No. 2002/0155712 to Urashima et al. ("Urashima")
1005	JP Patent Application Pub. No. JPH0563305 to Nagata et al. ("Nagata") with certified translation
1006	Keiper et al., Metal organic vapour-phase epitaxy (MOVPE) growth of InP and InGaAs using tertiarybutylarsine (TBA) and tertiarybutylphosphine (TBP) in N ₂ ambient, Journal of Crystal Growth (1999) ("Keiper")
1007	U.S. Patent No. 5,122,845 to Manabe et al. ("Manabe")
1008	U.S. Patent Application Pub. No. 2004/0119063 to Guo et al. ("Guo")
1009	U.S. Patent Application Pub. No. 2002/0090816 to Ashby et al. ("Ashby")
1010	Declarations of Sylvia Hall-Ellis, Ph.D.
1011	Herman et al., Epitaxy Physical Principles and Technical Implementation, Material Science (2004) ("Herman")
1012	Curriculum Vitae of Sylvia Hall-Ellis, Ph.D.
1013	Curriculum Vitae of Dr. Stan Shanfield
1014	Docket Sheet, <i>Akoustis Technologies, Inc. et al. v. Qorvo, Inc.</i> , Case No. 2:23-cv-00180 (E.D. Tex.)
1015	Zhang et al., Selective Growth of CdTe on Si and GaAs Substrates using Metalorganic Vapor Phase Epitaxy, Journal of Electronic Materials (2000) ("Zhang")

Petitioner's Reply to Patent Owner's Preliminary Response

Exhibit No.	Description
1016	Uen et al., Epitaxial growth of high-quality GaN on appropriately nitridated Si substrate by metal organic chemical vapor deposition, <i>Journal of Crystal Growth</i> (2005) ("Uen")
1017	First Amended Docket Control Order, <i>Akoustis Technologies, Inc. et al. v. Qorvo, Inc.</i> , Case No. 2:23-cv-00180 (E.D. Tex.), August 10, 2023
1018	Lex Machina List of Open Cases for Judge James Rodney Gilstrap, February 27, 2024
1019	Trifan, Study of the Early Stage of Growth and Epitaxy of GaN Thin Films on Sapphire, College of Arts and Sciences of Ohio University (2003) ("Trifan")
1020	Connelly, Nomenclature of Inorganic Chemistry, International Union of Pure and Applied Chemistry (2005) ("Connelly")
1021	Zang et al., Structural analysis of metalorganic chemical vapor deposited AlN nucleation layers on Si (111), <i>Journal of Crystal Growth</i> (2004) ("Zang")
1022	Nikishin et al., Growth of AlGa _N on Si(111) by gas source molecular beam epitaxy, <i>Applied Physics Letters</i> (2000) ("Nikishin")
1023	Nikishin et al., High quality GaN grown on Si(111) by gas source molecular beam epitaxy with ammonia <i>Applied Physics Letters</i> (1999) ("Nikishin II")
1024	Chen et al., Growth of high quality GaN layers with AlN buffer on Si(111) substrates, <i>Journal of Crystal Growth</i> (2001) ("Chen")
1025	Marchand et al., Metalorganic chemical vapor deposition of GaN on Si(111): Stress control and application to field-effect transistors, <i>Journal of Applied Physics</i> (2001) ("Marchand")
1026	Park et al., Growth of GaN Layer from the Single-Source Precursor (Et ₂ GaNH ₂) ₃ , <i>Chemical Materials</i> (1998) ("Park")
1027	Hull et al., Misfit Dislocations in Lattice-Mismatched Epitaxial Films, <i>Critical Review in Solid State and Material Sciences</i> (1992) ("Hull")

Petitioner's Reply to Patent Owner's Preliminary Response

Exhibit No.	Description
1028	Time to Milestone Information for E.D. Texas from Docket Navigator
1029	Akoustis' Original Complaint (Docket No. 01) in <i>Akoustis Technologies, Inc. et al. v. Qorvo, Inc.</i> , Case No. 2:23-cv-00180 (E.D. Tex.)
1030	Qorvo's (Redacted) Motion to Dismiss (Docket No. 24) in <i>Akoustis Technologies, Inc. et al. v. Qorvo, Inc.</i> , Case No. 2:23-cv-00180 (E.D. Tex.)
1031	Preliminary Claim Constructions in <i>Akoustis Technologies, Inc. et al. v. Qorvo, Inc.</i> , Case No. 2:23-cv-00180 (E.D. Tex.)
1032	Order Granting Akoustis's Motion for Leave to Amend Complaint and to Add Cornell as a Co-Plaintiff dated July 24, 2024 (Dkt. No. 121) in <i>Akoustis Technologies, Inc. et al. v. Qorvo, Inc.</i> , Case No. 2:23-cv-00180 (E.D. Tex.)
1033	Second Amended Docket Control Order dated August 13, 2024 (Dkt. No. 131)) in <i>Akoustis Technologies, Inc. et al. v. Qorvo, Inc.</i> , Case No. 2:23-cv-00180 (E.D. Tex.)
1034	Docket Sheet as of September 24, 2024, <i>Akoustis Technologies, Inc. et al. v. Qorvo, Inc.</i> , Case No. 2:23-cv-00180 (E.D. Tex.)

I. PO's *Fintiv* Arguments Are Wrong

IQE's IPR2024-00609 to which Qorvo seeks joinder has been instituted. *See* IPR2024-00609 (*IQE PLC v. Cornell Research Foundation Inc.*), Decision Granting Institution of *Inter Partes* Review (Paper No.9), September 17, 2024 (hereinafter "IQE ID"). Thus, Qorvo submits the *Fintiv* analysis is moot and should not prevent institution and joinder.

Should the Board wish to undertake a fulsome *Fintiv* analysis, institution is proper. In its POPR, PO argues that institution should be denied based on the schedule in the *Akoustis-Qorvo* litigation (the "EDTX case" or "EDTX Court" herein). EX1017. The Board found these arguments unpersuasive in the IQE ID.

Moreover, the facts upon which PO advanced its timing arguments have changed significantly. First, the EDTX Court issued a new schedule in August 2024, delaying the trial by four months (until May 19, 2025). EX1033.² Second, Qorvo and PO have agreed to file a joint motion requesting a stay of the EDTX case in view of the IQE ID. EX1034, Dkt No. 153. Such joint requests are typically granted. Under these circumstances, PO's arguments concerning the timing of the district court litigation are no longer applicable.

² The EDTX Court found a schedule delay necessary to address prejudice to Qorvo by PO being added as a party over a year into the case. EX1032.

Petitioner's Reply to Patent Owner's Preliminary Response

Factor 1 favors institution. PO argues Qorvo has not sought a stay and that it would likely be denied. POPR, 22-24. The IQE ID found this factor to be neutral in response to similar arguments. IQE ID at 9. But the parties have now agreed to ***jointly*** request a stay of the EDTX case based on the IQE ID. EDTX Courts routinely grant joint stay requests.³ Thus, factor 1 favors institution.

Factor 2 favors institution. PO argues this factor supports institution denial because a FWD would issue in early fall 2025, after the originally-scheduled EDTX case trial date. POPR, 24-25. The IQE ID found this factor to

³ See, e.g., September 13, 2024 Order (Dkt. 77), *Athalonz LLC v. Under Armour, Inc.*, No. 23-cv-00193 (E.D. Tex.); August 30, 2024 Order (Dkt. 175), *Greenthread, LLC v. OmniVision Techs., Inc.*, No. 23-cv-00212 (E.D. Tex.); June 14, 2024 Order (Dkt. 55), *Fendgo LLC v. Samsung Electronics Co.*, No. 23-cv-00221 (E.D. Tex.). Even when opposed, EDTX Courts grant stays in cases at similar points in the schedule. See, e.g., *Broadphone LLC v. Samsung Elecs. Co., Ltd.*, No. 23-cv-00001, 2024 WL 3524022, at *2 (E.D. Tex. Jul. 24, 2024) (granting stay seven months before trial where fact discovery remains); *Comm. Techs., Inc. v. Samsung Elecs. Am., Inc.*, No. 21-cv-00444, 2023 WL 1478447, at *1 (E.D. Tex. Feb. 2, 2023) (granting stay five months before trial and one month before fact discovery ends).

Petitioner's Reply to Patent Owner's Preliminary Response

weigh in favor of institution denial. IQE ID at 9-10. But the joint stay request, if granted, will alleviate any concern of trial occurring before a FWD. Moreover, even without a stay, the new EDTX case schedule sets trial for May 19, 2025, at the earliest, pending (i) the assigned judge's workload (676 active cases as of March 23, 2024 (EX1018)) and (ii) the outcome of Qorvo's Motion to Dismiss the *FAC* (*see* EX1034, Dkt No. 127). Thus, factor 2 favors institution.

Factor 3 favors institution. PO argues that this factor supports institution denial because there has been significant investment in the EDTX case. POPR, 25-26. The IQE ID disagreed that significant investment had occurred. IQE ID at 10-11. Qorvo further submits that PO's argument is moot in view of the new EDTX case schedule extending fact discovery until December 30, 2024 (EX1033 at 3) and/or the joint stay motion. The parties have yet to undertake the bulk of the work necessary to prepare the EDTX case for trial. For example, the parties in the EDTX case have not taken any depositions, engaged in expert discovery, produced email discovery in response to ESI discovery requests, or prepared or filed motions for summary judgment. Further, that work will be delayed until after any FWD if the EDTX Court grants the joint stay motion. The foregoing favors institution. *See, e.g., Juniper Networks, Inc. v. Packet Intelligence LLC*, IPR2020-00336, Paper 21 at 18 (PTAB Sept. 10, 2020) (institution favored if fact discovery incomplete). Also, there was no Petitioner delay, as Qorvo seeks to

join IQE's Petition and could not have done so until it was filed. Thus, factor 3 favors institution.

Factor 4 still strongly favors institution. PO argues Qorvo's *Sotera* stipulation relates to this Petition rather than IQE's and therefore "should not be seen as dispositive." POPR, 26-27. Not so. This Petition must be instituted for joinder, and the *Sotera* stipulation would be effective on that institution. Thus, factor 4 still strongly favors institution.

Factor 5 is still neutral. PO argues the party overlap between this IPR and the EDTX case weighs in favor of denial. POPR, 27-28. Qorvo disagrees. *Sand Revolution II, LLC v. Cont'l Intermodal Grp.-Trucking LLC*, IPR2019-01393, Paper 24 (June 16, 2020) (instituting where the parties are the same) (informative).

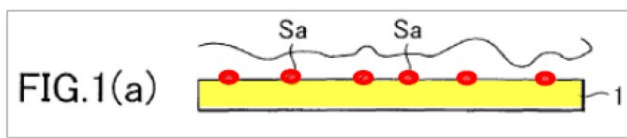
Factor 6 strongly favors institution for the reasons in Qorvo's Petition.

II. PO's Applied Construction Of Step c) Was Addressed by the Board

PO argues that "[c]laim 1 requires that at least one group II/III material is ***kept on*** after (b) pretreatment when the group V/VI material is introduced for the growth of the (c)/(d) nucleation and buffer layers" (emphasis added). POPR, 29-33 (citing passages from the '360 Patent's specification). The Board addressed this claim construction argument in the IQE ID. IQE ID at 16-19.

III. PO's Applied Construction Of Step b) is Wrong

PO argues that “pre-treating a surface of the substrate” excludes a process, such as in *Urashima*'s FIG. 1(a), where exposure of a substrate to group III reactants results in the deposition of Al or AlGa particles (“Sa” in red in annotated FIG. 1(a) formed on a substrate (yellow) surface). POPR, 34-35, EX1004, ¶¶[0089], [0140], [0171].



PO argues that this result shows that

only “a part of” the substrate surface has been pre-treated whereas step b) requires pretreatment of the entire substrate surface. POPR, 35-36 (citing passages from the '360 Patent's specification).⁴

In the IQE ID, the Board already found PO's interpretation is wrong. IQE ID at 19-21. PO's construction should be rejected for several additional reasons.

First, PO's narrowing construction was not advanced in the EDTX case.

EX2006, 2028. Second, step b) recites a process (*e.g.*, applying particular reactants at an elevated growth temperature) applied to the substrate surface (*e.g.*, the selected surface area), not the result of the process (*e.g.*, what structures may

⁴ Qorvo also notes that *Urashima* discloses that “metal nuclei Sa do not have to be isolated, non-contiguous particles, but can be in the form of a liquid that covers the surface.” *Urashima* at ¶[0107].

Petitioner's Reply to Patent Owner's Preliminary Response

form due to the process). Thus, a structural limitation should not be added to the claims unless demanded by the intrinsic record. *Third*, there is no intrinsic record support for limiting the scope of step b) as PO advocates. What little description of “pre-treatment” there is largely parrots the claim language and describes aspects of the process set forth in step b). *See, e.g.*, EX1001 at Abstract, 1:53-57, 2:27-30, 2:47-50, 3:15-19, 3:65-4:7, 4:36-51, FIG. 1. The only portions of the '360 patent's specification that touch even remotely on the results of the pretreatment are the indications that it “wets” the substrate surface (EX1001 at Abstract) and that “[i]n a preferred embodiment, aluminum reacts with the surface of the substrate providing the needed nucleation sites while gallium prepares the aluminum saturated surface for subsequent growth of the epitaxial layer, preferably an epitaxial layer including AlN, AlGa_N, or GaN” (EX1001 at 1:65-2:2. But PO offers no explanation for how either description compels its proposed construction⁵ and, as the Board observed, the latter is merely a description of a preferred embodiment.

⁵ For example, PO does not explain why the nucleation sites Sa in *Urashima's* FIG. 1(a) are different from the nucleation sites described in the forgoing passage.

Petitioner's Reply to Patent Owner's Preliminary Response

Dated: September 24, 2024

Respectfully submitted,

/s/ Robert M. Masters

Robert M. Masters (Reg. No. 35,603)

Timothy Cremen (Reg. No. 50,855)

Jonathan R. DeFosse (*pro hac vice* to be requested)

SHEPPARD, MULLIN, RICHTER & HAMPTON LLP

2099 Pennsylvania Avenue, NW, Suite 100

Washington, DC 20006-6801

Tel.: 202.747.1900

Fax: 202.747.1901

LegalTM-Qorvo-IPR@sheppardmullin.com

Counsel for Petitioner Qorvo, Inc.

Petitioner's Reply to Patent Owner's Preliminary Response

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), the undersigned hereby certifies that a true and correct copy of the foregoing Petitioner's Reply to Patent Owner's Preliminary Response were filed with the PTAB through P-TACTS and served via email on the attorneys of record at the following addresses:

John B. Campbell	jcampbell@McKoolSmith.com
James E. Quigley	jquigley@McKoolSmith.com
George T. Fishback, Jr.	gfishback@McKoolSmith.com
	Akoustis_Qorvo@McKoolSmith.com

Date: September 24, 2024

/s/ Robert M. Masters
Robert M. Masters (Reg. No. 35,603)
**SHEPPARD, MULLIN, RICHTER &
HAMPTON LLP**
2099 Pennsylvania Avenue, Suite 100
Washington, DC 20006
Tel.: (202) 747-1900
Fax: (202) 747-1901
LegalTm-Qorvo-IPR@sheppardmullin.com
Counsel for Petitioner Qorvo, Inc.