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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
13/668,077 11/02/2012 Leilei Zhang NVDA/SC-12-0130-US 7015

102324 7590 11/17/2016
Artegis Law Group, LLP/NVIDIA
7710 Cherry Park Drive Suite T #104
Houston, TX 77095

Table with 1 column: EXAMINER
NGUYEN, DILINH P

Table with 2 columns: ART UNIT, PAPER NUMBER
2893

Table with 2 columns: NOTIFICATION DATE, DELIVERY MODE
11/17/2016 ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

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mmccauley@artegislaw.com

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* NVIDIA CORPORATION<sup>1</sup>  
Appellant

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Appeal 2015-005752  
Application 13/668,077  
Technology Center 2800

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Before JAMES C. HOUSEL, CHRISTOPHER L. OGDEN, and  
JEFFREY R. SNAY, *Administrative Patent Judges*.

OGDEN, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant appeals under 35 U.S.C. § 134(a) from the Examiner's decision<sup>2</sup> rejecting claims 1–20 in the above-identified application. We have jurisdiction pursuant to 35 U.S.C. § 6(b).

We REVERSE.

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<sup>1</sup> NVIDIA Corporation is the applicant under 37 C.F.R. ¶ 1.46 (2012), and is identified as the real party in interest. Appeal Br. 3, Oct. 14, 2014.

<sup>2</sup> Office Action, Feb. 10, 2014 [hereinafter Final Action].



planarity,” and “is fastened to a chip mounting surface 110 of the substrate structure 125.” *Id.* ¶ 7.

Figure 3, representing an embodiment of Appellant’s invention, *see id.* ¶ 18, is reproduced below:

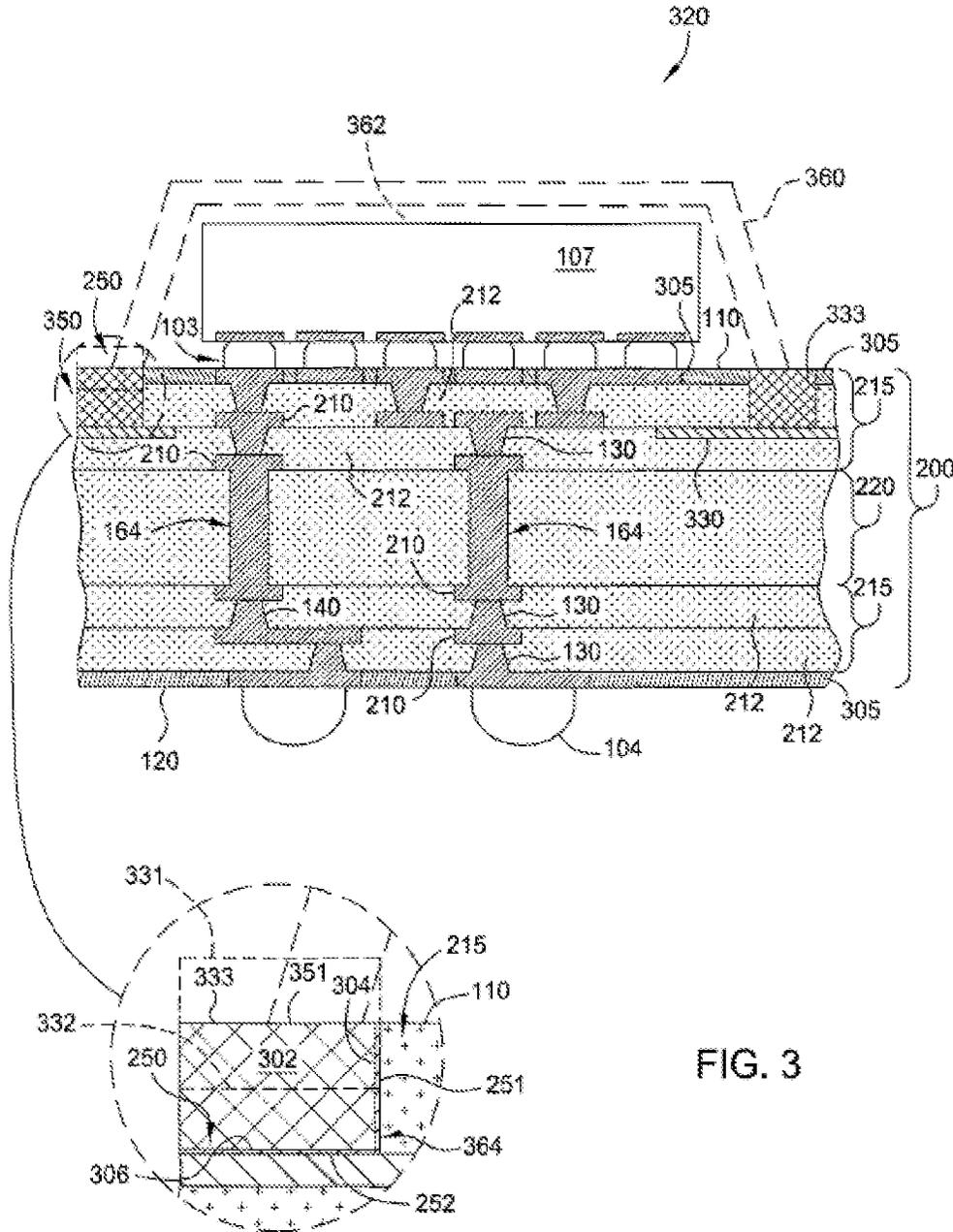


FIG. 3

Figure 3 depicts a stiffening microstructure 351, which “may be fabricated from a rigid material, such as stainless steel, aluminum, among others.”

Amended Specification ¶ 29, Oct. 17, 2013 [hereinafter Am. Spec.]. The stiffening microstructure 351 includes a base 302 that at least partially fits inside an opening 250 of the substrate structure 200. *See id.* According to the Specification, this configuration

is more warp resistant compared to conventional packaging substrates. Greater control of warping is gained through a larger stiffening microstructure and an increase contact area between the stiffening microstructure and the packaging substrate without increasing the overall height of the packaged chip. With the bottom of the stiffening microstructure extending below the chip mounting surface of the packaging substrate, the sectional profile of the stiffening microstructure can be selected to enhance torsional rigidity of the stiffening microstructure and thus provide greater warpage control for the packaging substrate.

*Id.* ¶ 22.

Independent claim 1 is representative of the claims on appeal:

1. A packaging substrate comprising:
  - a packaging structure having a chip mounting surface and a bottom surface, the packaging structure having at a plurality of conductive paths formed between the chip mounting surface and the bottom surface, the conductive paths providing electrical connection between an integrated circuit chip disposed on the chip mounting surface and the bottom surface, the packaging structure having an opening formed in the chip mounting surface proximate a perimeter of the packaging structure; and
  - a stiffening microstructure disposed in the opening and coupled to the packaging structure.*

Appeal Br. 13 (emphasis added). Independent claim 14 similarly includes a “stiffening microstructure disposed in the opening and coupled to the packaging structure,” *id.* at 15.

The Examiner maintains the following grounds of rejection:

1. Claims 1–3, 7–9, and 11 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent Application Pub. No.

US 2010/0308451 A1 (published Dec. 9, 2010) [hereinafter Kodani]. *See* Final Action 3–4.

2. Claims 4–6, 10, and 14–20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kodani, and further in view of the admitted prior art in Appellant’s Figure 1. *See* Final Action 5–8.

3. Claims 12 and 13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kodani in view of U.S. Patent No. US 6,297,550 B1 (issued Oct. 2, 2001). *See* Final Action 8–9.

#### DISCUSSION

The Examiner finds that Kodani discloses a stiffening microstructure disposed in the opening and coupled to the packaging structure, as required by claims 1 and 14. Final Action 4, 6 (citing Kodani Fig. 11). Figure 11 of Kodani is reproduced below:

**FIG. 11**

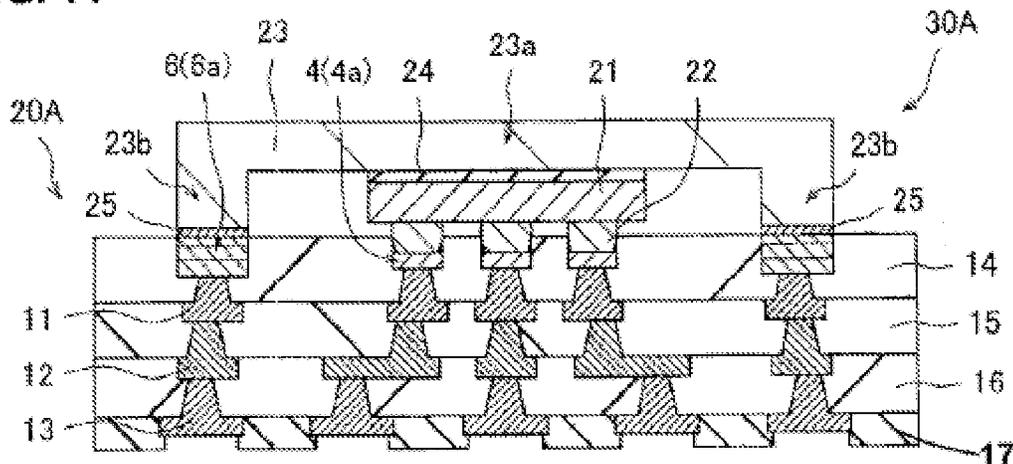


Figure 11 depicts a semiconductor package in which the electrode pad 6 or 6a is exposed from the surface of an insulating interlayer 14 of packaging structure 20A. *See* Kodani ¶ 107. The Examiner finds that

electrode pads 6 of Kodani [Fig. 11] are disposed in the openings of the packaging structure 20A and located at the peripheral regions of the chip mounting surface. Therefore, the electrode pads 6 of Kodani, similar to the claimed structure of the present invention, are capable of providing stiffness to the package of Kodani.

Answer 2. The Examiner also finds that “[s]ince the materials employed in making electrode pads 6 of Kodani are rigid materials such as Au, Ni, Cu and Pd (paragraph 0077), it is reasonable to assume that the electrode pads 6 of Kodani can be interpreted as stiffening microstructures, which is consistent with the Appellants’ disclosure.” *Id.* at 3. Thus, the Examiner finds that the “stiffening” limitation of claims 1 and 14 is inherently present in Kodani. *See* Answer 2–3.

We interpret claims 1 and 14 according to the broadest reasonable construction in light of the Specification. *See In re Man Machine Interface Techs. LLC*, 822 F.3d 1282, 1287 (Fed. Cir. 2016). In addition, our interpretation “must be consistent with the one that those skilled in the art would reach.” *In re Cortright*, 165 F.3d 1353, 1358 (Fed. Cir. 1999). According to the Specification, the invention reflects an improvement over surface-mounted stiffening microstructures, such as the structure 150 depicted in Figure 1, by incorporating the microstructure into an opening in the chip mounting surface. *See* Spec. ¶¶ 4–12, 22. The term *stiffening*, as used in the Specification, is a relative term. For example, *any* solid material could be considered “stiffening” in comparison to air or a vacuum. However, it is not reasonable, in view of the Specification, to interpret the

term *stiffening microstructure* to simply mean any microstructure. The Specification indicates that the purpose of the stiffening microstructure is to “provide[] tensional rigidity to the packaging structure.” *See id.* ¶ 7. This added stiffness is in comparison to the packaging structure material excavated to make room for the stiffening microstructure. *See, e.g.,* Spec. ¶¶ 3–4, 7, 22. Thus, the broadest reasonable interpretation of the term *stiffening microstructure* is a microstructure that adds stiffness to the package in comparison to the material excavated by the opening.

In light of this interpretation, we are not persuaded that Kodani inherently discloses a stiffening microstructure. In order for a claim to be rejected on the basis of an inherent disclosure in the prior art, the required limitation must be necessarily present in the prior art. *See In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999). However, Kodani discloses that as a result of the structure and dimensions of the electrode pads and the packaging substrate, “stress or strain imposed on the electrode pads 4a and 6a, the external connection terminals 22, and the connection portion 23b can be prevented, and the reliability of the semiconductor package 30A can be improved.” Appeal Br. 10 (citing Kodani ¶ 109). In light of this disclosure, we are not persuaded that the electrode pads 6a in Kodani necessarily add appreciable stiffness to the package in comparison to the material of the insulating interlayer 14 in which the electrode pads are formed.

Therefore, by a preponderance of the evidence on this appeal record, we are persuaded that the Examiner reversibly erred in rejecting claims 1 and 14. The rejections of claims 2–13 and 15–20 do not remedy this error. Thus, we reverse the Examiner’s decision to reject claims 1–20.

Appeal 2015-005752  
Application 13/668,077

DECISION

The Examiner's decision is reversed.

REVERSED