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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte EDWARD FUERGUT and MANFRED MENGEL

Appeal 2019-000207
Application 15/256,640
Technology Center 2800

Before LINDA M. GAUDETTE, RAE LYNN P. GUEST, and LILAN REN, *Administrative Patent Judges*.

GUEST, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's decision to reject claims 1–7 and 10–15.[2] We have jurisdiction under 35 U.S.C. § 6(b).

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[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as Infineon Technologies AG. Appeal Br. 3.

[2] The Examiner has indicated that pending claims 8 and 9 include allowable subject matter but stand objected to due to their dependency upon rejected claims. Final Act. 2, 11.

We AFFIRM.[3]

CLAIMED SUBJECT MATTER

The claims on appeal are directed to a method for manufacturing an electronic semiconductor package comprising an encapsulated electronic chip. *See* Appeal Br. 16, Claim App'x, Claim 1. According to the Specification, providing a discontinuity in the encapsulation structure and filling the discontinuity with a thermal interface structure (1) reduces electrical current leakage, due to the improved adhesion of the thermal interface structure to the encapsulation structure with increased contact surfaces and an increased path length over which the leaked current has to travel, and (2) improves reliability under mechanical and electrical stress. Spec. 3:9–4:10. Claim 1, reproduced below, is illustrative of the claimed subject matter:

> 1. Method for manufacturing an electronic semiconductor package, wherein the method comprises:
>
> coupling an electronic chip to a carrier;
>
> encapsulating the electronic chip at least partially and encapsulating the carrier partially by an encapsulation structure having a discontinuity;
>
> covering at least a part of the discontinuity and a volume connected thereto, which adjoins an exposed surface section of the carrier, with an electrically insulating thermal interface structure, which electrically decouples at least a part of the carrier with respect to a surrounding.

[3] In our Decision, we refer to the Specification ("Spec.") filed Sept. 5, 2016; the Final Office Action dated Sept. 19, 2017 ("Final Act."); the Appeal Brief filed Apr. 13, 2018 ("Appeal Br."); the Examiner's Answer dated Aug. 7, 2018 ("Ans."); and the Reply Brief filed Oct. 7, 2018 ("Reply Br.").

REFERENCES

The prior art relied upon by the Examiner is:

Name	Reference	Date
Endo	US 4,950,427	Aug. 21, 1990
Sun et al.	US 2011/0049704 Al	Mar. 3, 2011
Chau et al.	US 8,404,520 Bl	Mar. 26, 2013
Kachi et al.[4]	JP 04-299848 A	Oct. 23, 1992
Tabuchi[5]	JP 09-153576 A	Oct. 6, 1997

REJECTIONS

1. Claims 1, 2, 10–15 are rejected under 35 U.S.C. § 103 as being unpatentable over Endo in view of Tabuchi.
2. Claims 3 and 4 are rejected under 35 U.S.C. § 103 as being unpatentable over Endo in view of Tabuchi and further in view of Kachi.
3. Claims 5–7 are rejected under 35 U.S.C. § 103 as being unpatentable over Endo in view of Tabuchi and further in view of Chau.
4. Alternatively, claims 5 and 7 are rejected under 35 U.S.C. § 103 as being unpatentable over Endo in view of Tabuchi and further in view of Sun.

OPINION

We review the appealed rejections for error based upon the issues identified by Appellant and in light of the arguments and evidence produced thereon. *Ex parte Frye*, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential),

[4] The Examiner and Appellant refer to the Figures of the Japanese references as well as the English language abstract of record.
[5] The Examiner and Appellant refer to the Figures of the Japanese reference as well as the English language computer translation of record.

cited with approval in In re Jung, 637 F.3d 1356, 1365 (Fed. Cir. 2011) ("[I]t has long been the Board's practice to require an applicant to identify the alleged error in the [E]xaminer's rejections."). After considering the evidence presented in this Appeal and each of Appellant's arguments, we affirm the Examiner's decision to reject the claims on appeal.

Appellant presents separate arguments for claim 1, as representative of all of the claims on appeal, and for claims 3 and 4 as a group. For claims 5–7, Appellant presents substantially identical arguments to those made for claims 3 and 4 under separate heading. Accordingly, we select claims 1 and 3 as representative claims in addressing Appellant's arguments.

Claim 1

With respect to claim 1, Appellant contends that Endo teaches away from the modification argued by the Examiner because Endo is directed towards an improved chip having an entirely different structure than the prior art embodiment relied upon in the Examiner's rejection (*compare* Figure 1B (prior art), *with* Figure 2B). Appeal Br. 10–11. According to Appellant, the Examiner's proposed modification "would compromise the intended high frequency performance of the transistor package" of Endo and "the compromise in performance accompanying such an arrangement would result in the transistor package not being useful for its intended purpose." *Id.* at 11.

The Examiner explains that the rejection relies on modifying the prior art Figure 1B teaching in Endo and "the Tabuchi reference having the discontinuity for the mold and heat sink to improve the prior art device structure of Fig. 1A and 1B connection *in a different way* than the improvement Endo made with the device structure of Fig. 2A and 2B." Ans. 2 (emphasis added). According to the Examiner, Figure 1B of Endo is "an

enabled and functional device even without the improvement the Endo makes" and Appellant has not shown the prior art structure to be inoperable or that the proposed modification would change the principle of operation of the device of Figure 1B. *Id.* at 3.

In response, Appellant asserts that the Examiner's reasoning is "speculative" and that a rejection must not "compromise . . . the stated intended goal of the reference" as the skilled artisan "would [not] adopt such a modification at the expense of the intended goal." Reply Br. 3.

Appellant's argument is not persuasive of error in the Examiner's rejection. The Supreme Court has made clear that "*any* need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed." *KSR Int'l Co. v. Teleflex Inc*., 550 U.S. 398, 420 (2007) (emphasis added). In this case, the Examiner relied on the specific problem and solution taught in Tabuchi and determined that a skilled artisan would understand its relevance to the prior art structure taught by Endo. Final Act. 6; Ans. 3.

We consider all the teachings of Endo. *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1568 (Fed. Cir. 1987) ("[A] prior patent must be considered in its entirety, i.e., as a whole, including portions that would lead away from the invention in suit."). Yet, review of Endo indicates that the improvement shown in Figure 2B, as noted by the Appellant (*see* Reply Br. 3–4), is specifically for "[s]ome circuits [that] require use of the transistor devices with a small feedback capacitance Cob" such as "a high frequency output circuit, e.g., an ultra-fine video signal output circuit." Endo, col. 1, ll. 54–57. We note the claims on appeal are not limited to any particular electronic semiconductor package use, and particularly not to those

semiconductors used for a high frequency output circuit or a circuit requiring any particular feedback capacitance. Appellant directs us to no evidence of record that the prior art "conventional bi-polar transistor," taught in Figure 1B of Endo (*see* Endo, col. 1, ll. 10–11, col. 3, ll. 13–16), would not have been a suitable transistor for a variety of non-high frequency output circuits, which are encompassed within the broad scope of the recited electronic semiconductor package of claim 1. *See* Ans. 3 ("[T]he prior art structure of Fig. 1A and 1B in the Endo reference is an enabled and functional device even without the improvement that Endo makes with the structure of Fig. 2A and 2B."). Thus, the additional teachings of Endo, while an interesting technological advance for transistors used in a particular way, is not particularly relevant to and does not teach away from the claimed invention, in light of the broader scope of Appellant's claim 1.

We agree with the Examiner (*see* Ans. 3) that the skilled artisan would have recognized improvements, such as those taught by Tabuchi, to a Figure 1B conventional circuit for more conventional uses. "[T]he question is whether there is something in the prior art as a whole to suggest the *desirability,* and thus the obviousness, of making the combination," not whether there is something in the prior art as a whole to suggest that the combination is the *most desirable* combination available. *In re Fulton,* 391 F.3d 1195, 1200 (Fed. Cir. 2004). Accordingly, the Examiner has provided a sufficient reason the skilled artisan would have modified a conventional transistor, taught by Figure 1B of Endo, with discontinuities in its encapsulation filled by a thermal interface structure as taught by Tabuchi, "in order to establish an improved mechanical connection between the encapsulation and the heat dissipation element." Final Act. 6; Ans. 3.

Claim 3

Appellant argues that the Examiner has not provided a reason for the skilled artisan "to modify the manufacturing method of Endo '427 in the manner argue[d] by the Examiner" because such modification "does not appear to have been necessitated by any problem described in Endo '427." Appeal Br. 12; *see also id.* at 13, 14 (applying the same argument to claims 5–7).

We do not find these arguments persuasive for the reasons set forth by the Examiner in the Final Rejection and the Answer. *See* Final Act. 8; Ans. 4–6. As is quite clear in the Final Office Action (Final Act. 8), which is quoted in the Answer (*see* Ans. 4–6),[6] the Examiner's rejection is based on modifying the teachings of Endo in combination with Tabuchi in light of the lack of teaching in Tabuchi as to precisely how the discontinuity in the encapsulation is achieve therein. We agree with the Examiner that the skilled artisan would have looked to known methods of forming discontinuities in chip encapsulations, such as those taught by Kachi (or Chau or Sun).

CONCLUSION

The Examiner's rejections are affirmed.

[6] Accordingly, we are also not persuaded by Appellant's argument that the Examiner failed to present an articulated reason as to why the claims were obvious during prosecution. *See* Reply Br. 4.

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1, 2, 10–15	103	Endo/Tabuchi	1, 2, 10–15	
3, 4	103	Endo/Tabuchi/Kachi	3, 4	
5–7	103	Endo/Tabuchi/Chau	5–7	
5, 7	103	Endo/Tabuchi/Sun	5, 7	
Overall Outcome			1–7, 10–15	

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED