

Internal distribution code:

- (A) [-] Publication in OJ
- (B) [-] To Chairmen and Members
- (C) [-] To Chairmen
- (D) [X] No distribution

**Datasheet for the decision
of 4 April 2022**

Case Number: T 0310/16 - 3.4.01

Application Number: 10195145.7

Publication Number: 2290380

IPC: G01R15/20, G01R33/02,
G01R33/06, G01R33/07,
G01R33/09, H01L43/06

Language of the proceedings: EN

Title of invention:

Arrangements for an integrated sensor

Patent Proprietor:

Allegro MicroSystems, LLC

Opponent:

Micronas GmbH

Headword:

Two magnetic sensors / ALLEGRO MICROSYSTEMS

Relevant legal provisions:

EPC Art. 54

RPBA 2020 Art. 13(1)

Keyword:

Novelty - (no)

Amendment to appeal case - exercise of discretion

Decisions cited:

T 1903/13



Beschwerdekammern

Boards of Appeal

Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 0310/16 - 3.4.01

D E C I S I O N
of Technical Board of Appeal 3.4.01
of 4 April 2022

Appellant: Micronas GmbH
(Opponent) Hans-Bunte-Strasse 19
79108 Freiburg (DE)

Representative: Koch, Bertram
Koch Müller
Patentanwalts-gesellschaft mbH
Maaßstraße 32/1
69123 Heidelberg (DE)

Respondent: Allegro MicroSystems, LLC
(Patent Proprietor) 955 Perimeter Road,
Manchester, NH 03103-3353 (US)

Representative: South, Nicholas Geoffrey
A.A. Thornton & Co.
Octagon Point
5 Cheapside
London EC2V 6AA (GB)

Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 15 December
2015 rejecting the opposition filed against
European patent No. 2290380 pursuant to Article
101(2) EPC.**

Composition of the Board:

Chair P. Scriven
Members: B. Noll
D. Rogers

Summary of Facts and Submissions

- I. The Opposition Division rejected the opposition against the patent. The opponent's appeal is against this decision.

- II. In the statement of grounds of appeal, the opponent argued, *inter alia*, that claim 1 as granted lacked novelty (Article 54(2) EPC) having regard to

D4: DE 10 2004 017 191 A1.

- III. With its response to the appeal, the proprietor requested that the appeal be dismissed, and submitted five auxiliary requests.

- IV. In a communication sent with a summons to oral proceedings, the Board gave its preliminary opinion on the case. The Board considered that claim 1 as granted lacked novelty having regard to D4, and so did claim 1 of the first and second auxiliary requests. Claim 1 of the third, fourth, and fifth auxiliary requests did not comply with Article 84 EPC.

- V. In response to the Board's communication, the proprietor submitted amended auxiliary requests 1, 3, and 4, replacing the auxiliary requests with the same numbering that were previously on file.

VI. At the oral proceedings, after a discussion on novelty of claim 1 as granted and whether or not the auxiliary requests related to a sequence of converging limitations, the proprietor withdrew auxiliary requests 1-3. The oral proceedings continued with a discussion of the patentability of auxiliary request 4, filed in response to the board's communication, and auxiliary request 5, filed with the proprietor's reply to the opponent's appeal.

VII. The opponent's final formulation of its request was that the decision under appeal be set aside and the patent revoked.

VIII. The proprietor's final formulation of its requests was that the appeal be dismissed; or, alternatively, that the decision under appeal be set aside and the patent maintained on the basis of auxiliary request 4 (filed in response to the Board's communication) or auxiliary request 5 (filed in response to the appeal).

IX. Claim 1 of the main request (patent as granted) reads:

An integrated circuit, comprising:

a substrate;

a first magnetic field sensing element

disposed on a surface of the substrate; and

a second magnetic field sensing element

disposed on a surface of the substrate,

wherein the second magnetic field sensing

element has a different structure than the

first magnetic field sensing element and

wherein the first magnetic field sensing element and the second magnetic field sensing element have different sensitivities to magnetic fields;

characterised in that the integrated circuit is configured to provide a first operating range responsive to the first magnetic field sensing element and a second selected different operating range responsive to the second magnetic field sensing element.

X. Claim 1 of auxiliary request 4 adds, at the end:

... wherein the first magnetic field sensing element and the second magnetic field sensing element are formed in respective regions of the substrate having different doping or different material properties.

XI. Claim 1 of auxiliary request 5 adds to claim 1 as granted, at the end:

... wherein the substrate is comprised of Si and the first magnetic field sensing element is a SiGe Hall effect element formed in a region of the substrate implanted with Ge and the second magnetic field sensing element is a Si Hall effect element formed in a different region of the substrate.

XII. The parties' submissions, insofar they are relevant for the decision, are discussed in the Reasons, below.

Reasons for the Decision

Main request, Claim 1 - novelty

1. D4 discloses a measuring arrangement for determining the speed and direction of rotation of a gear wheel, by measuring horizontal and vertical components of the magnetic field at a point close to the gear wheel. The magnetic field at that point depends on the instantaneous position of the teeth and gaps of the gear wheel relative to the point (D4, Figure 2A). Rotational speed and direction of rotation of the gear wheel can be derived when the temporal course of the magnetic field components is known. (Figure 5).

2. For measuring the magnetic field, D4 discloses an integrated circuit with two magnetic field sensors. It has a substrate (D4, Figure 4), a magnetoresistive sensor 102 as a first sensing element for detecting the horizontal magnetic field component H_x , and a lateral Hall probe 104 as a second sensing element for detecting the vertical field component H_y . The sensing elements are disposed on a surface of the substrate. In the present case, the preposition "on" means that, depending on the manufacturing process used, the actual sensing element may be above or below the surface of the substrate.

3. Claim 1 of the patent defines that the first and second magnetic field sensing elements have different sensitivities to magnetic fields. This does not define the sensitivities on the basis of their physical properties or on the basis of specific sensitivity values, but merely excludes them from being identical. The feature has the character of a disclaimer.
4. D4 does not explicitly address the sensitivity of each sensor element. However, the skilled reader, considering that the sensors are of different types (GMR and Hall), and that they are configured to selectively measure horizontal and vertical components of the magnetic field, respectively, would have understood that responses of the sensor elements to the magnetic field are inherently different.
5. The proprietor argued that, since both sensing elements in D4 had to sense AC components of the magnetic field of the same amplitude but only for different directions, it was to be assumed that their sensitivities to the AC component were equal. The skilled person was also aware that sensing elements can be manufactured using different technologies but with the same sensitivity.
6. This argument is not persuasive. If the claim should be understood in a narrow way, such that the sensor elements are different from each other with regard to a specifically-defined sensitivity that only concerns AC components of the magnetic field, this would have to be explicitly indicated by a corresponding definition in the claim. However, the claim is not limited in this way, and so does not differ from D4. Since, in D4, Figure 2B, the vertical field component has an offset, the sensing element 104 has to cope with the large

offset whereas the sensing element 102 for the horizontal component does not. There is nothing in D4 that suggests the sensitivities of the two sensing elements are deliberately set to be same.

7. The feature, in claim 1, that the first and second sensor elements have different sensitivities, does not, therefore, distinguish the claimed circuit from that of D4.
8. Claim 1 has the further definition, that the integrated circuit is configured to provide a first operating range responsive to the first sensing element, and a second, different operating range responsive to the second sensing element. This feature defines the operating ranges only by excluding their being equal.
9. D4, Figure 2B, shows that the sensing element 104 for the vertical field component is operated in a range about an offset, whereas the sensing element 102 for the horizontal field component is operated in a range about zero. The operating ranges for the sensors are, therefore, different.
10. The proprietor argued that in claim 1 it was the integrated circuit as a whole that provided the different operating ranges. Moreover, the DC offset in the signal of the sensing element 104 in D4 would not contribute to the range of operation relevant for determining speed or position. The operating ranges relevant for the AC component were not different in D4.
11. The Board does not agree. The proprietor's argument might apply if the operating ranges had been defined as being those of an AC component of the magnetic field

during the operation of the sensor. However, claim 1 only requires that the operating ranges responsive to the sensing elements be different, without any further distinguishing feature over D4 as regards the operating ranges of the sensing elements.

12. In conclusion, the integrated circuit as defined in claim 1 is disclosed by D4. Claim 1 of the main request lacks novelty for the above reasons (Article 54(2) EPC).

Auxiliary requests 4 and 5 - admissibility

13. Any amendment to a party's appeal case may be admitted only at the discretion of the Board (Article 13(1) RPBA).
14. According to the jurisprudence of the Boards of Appeal, the admissibility of amendments to claims depends on whether the set of requests converges with the previously-claimed subject-matter, so that it is further developed in a common direction and is increasingly limited (T 1903/13, grounds 3.3.4).
15. The proprietor's sets of claims at the beginning of oral proceedings were somewhat complex. Auxiliary requests 1 to 5, filed with the reply to the appeal had been, in part, replaced: auxiliary requests 1, 3, and 4, were filed for the first time one month before the oral proceedings and some 13 months after the Board's preliminary opinion.
16. Thus, the proprietor's case at the beginning of the oral proceedings included a request to set aside the

decision under appeal and to maintain the patent on the basis of one of five auxiliary requests:

- Auxiliary request 1 - filed on 4 March 2022
- Auxiliary request 2 - filed with the reply to the grounds of appeal
- Auxiliary request 3 - filed on 4 March 2022
- Auxiliary request 4 - filed on 4 March 2022
- Auxiliary request 5 - filed with the reply to the grounds of appeal

This set of requests became part of the case for the first time on 4 March 2022.

17. During oral proceedings, the chair stated the Board's opinion that auxiliary requests 1 to 5, which as a set had been before the board since 4 March 2022, did not appear to be convergent.
18. As a reaction to the discussion on the non-convergence of the set of auxiliary requests 1 to 5, and hence their possible non-admission into the proceedings, the proprietor withdrew auxiliary requests 1 to 3.
19. Thus, during the course of oral proceedings, the proprietor presented, for the first time, a case based on auxiliary requests 4 and 5; auxiliary request 4 having been filed for the first time on 4 March 2022, and auxiliary request 5 having been filed with the reply to the grounds of appeal.
20. The main request and some of the previous auxiliary requests were concerned with the structures and sensitivities of the two sensors.

21. Auxiliary requests 1 - 3, filed with the response to the appeal, were directed to combinations of Hall sensors in different orientations and to combinations of Hall sensors with magnetoresistance sensors. The meaning of *different structure* in claim 1 of the main request was argued to mean either of these two combinations.

22. Auxiliary requests 4 and 5 relate to the relative positioning of the sensors on the substrate and the material properties of the substrate. These requests thus give a different meaning to the term *different structure* from that argued for in the earlier and higher-ranking requests. Nothing in the patent, and nothing in the earlier requests, relates the relative positioning of the sensors and the material properties of the substrate to the structures and sensitivities of the sensors. These two requests, therefore, follow a different line from the main request and from any of the other, earlier and higher-ranked requests. They are divergent.

23. For these reasons, the Board decided that auxiliary requests 4 and 5 be not admitted into the proceedings.

Order

For these reasons it is decided that:

The decision under appeal is set aside.

The patent is revoked.

The Registrar:

The Chair:



D. Meyfarth

P. Scriven

Decision electronically authenticated