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Datasheet for the decision of 12 March 2024

Case Number: T 1700/20 - 3.5.02

Application Number: 12875573.3

Publication Number: 2833532

IPC: H02M3/335, H02M3/337

Language of the proceedings: EN

Title of invention:
Voltage regulating circuit

Applicant:
Huawei Technologies Co., Ltd.

Relevant legal provisions:
EPC Art. 54, 56, 123(2)

Keyword:
Novelty - (yes) - after amendment
Inventive step - (yes) - after amendment
Amendments - allowable (yes)

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Case Number: T 1700/20 - 3.5.02

D E C I S I O N
of Technical Board of Appeal 3.5.02
of 12 March 2024

Appellant: (Applicant)	Huawei Technologies Co., Ltd. Huawei Administration Building Bantian Longgang District Shenzhen, Guangdong 518129 (CN)
Representative:	Pfenning, Meinig & Partner mbB Patent- und Rechtsanwälte Theresienhöhe 11a 80339 München (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 11 March 2020 refusing European patent application No. 12875573.3 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	R. Lord
Members:	G. Flyng
	A. Bacchin

Summary of Facts and Submissions

I. The applicant's appeal contests the examining division's decision to refuse the European patent application 12 875 573.3.

II. The following document references are used in this decision:

D1: DE 10 2004 030117 A1
D2: JP S55 136870 A
D3: US 2012/051095 A1
D4: GB 2 476 508 A

III. In the contested decision, the examining division considered the applicant's requests for grant of a patent on the basis of the claims of a main request and an auxiliary request, both filed on 13 December 2019. Claim 1 of the main request was found to lack novelty in the sense of Article 54 EPC from the prior art document D1. The auxiliary request was found to contravene Article 123(2) EPC.

IV. With the statement of grounds of appeal the appellant filed sets of claims according to a first auxiliary request and a second auxiliary request.

V. The appellant (applicant) requested in the statement of grounds of appeal that the decision under appeal be set aside and that a patent be granted on the basis of the claims of the main request filed on 13 December 2019, alternatively on the basis of the claims of the first auxiliary request or the second auxiliary request filed with the statement of grounds of appeal. The appellant requested oral proceedings in case the Board did not

intend to grant a patent on the basis of the main request.

VI. The board summoned the appellant to attend oral proceedings, setting out their preliminary observations on the appeal in a communication pursuant to Article 15(1) RPBA. The board considered that the subject-matter of claim 1 of the main request lacked novelty over document D1. However, the board indicated that subject to correction of some grammatical inconsistencies, the claims of the first auxiliary request did not give rise to any issues of added subject-matter and met the requirements for novelty and inventive step.

VII. In a letter dated 22 January 2024 but filed on 23 January 2024, the appellant stated that they withdrew their former main request. Furthermore with that letter they filed a set of claims based on their former first auxiliary request, in which grammatical inconsistencies had been corrected as suggested in the board's communication pursuant to Article 15(1) RPBA, and filed a replacement description page 2a. This request thus became their main request, and the former second auxiliary request became their first auxiliary request. The appellant submitted that with the amendments filed on 23 January 2024, the claims and the description were now in condition for grant and requested that the board exercise the power to issue a communication pursuant to Rule 71(3) EPC, or as an auxiliary measure, remit the case to the Examining Division.

VIII. In view of the appellant's letter filed 23 January 2024 the Board cancelled the oral proceedings.

IX. The set of claims filed on 23 January 2024 comprises an independent claim 1 and dependent claims 2 to 6. Independent claim 1 reads as follows:

"1. A voltage regulating circuit (9), comprising:

a main loop unit (11), configured to output, according to an input signal of a voltage source (10, 20), a first voltage signal whose voltage value is equal to a voltage value of the voltage source (10, 20);

a voltage boosting unit (12, 21), configured to output a second voltage signal according to the input signal, wherein a sum of the second voltage signal and the first voltage signal forms an output signal of the voltage regulating circuit (9);

a switching control unit (13, 23), configured to compare the first voltage signal with a preset first reference voltage, and when the first voltage signal is greater than or equal to the first reference voltage, control the second voltage signal output by the voltage boosting unit (12, 21) to be zero; and

a short-circuit switch (121, 22) connected to the switching control unit (13, 23), so that the switching control (13, 23) unit controls, when it is determined that the first voltage signal is greater than or equal to the first reference voltage, the short-circuit switch (121, 22) to be closed, to enable the second voltage signal output by the voltage boosting unit (12, 21) to be zero;

characterized in that

the short-circuit switch (121, 22) is disposed between output ends of the voltage boosting unit (12, 21) wherein, when the short-circuit switch (121, 22) is controlled to be closed by the switching control unit (13), the output ends of the voltage boosting unit (12) are short-circuited."

Reasons for the Decision

Main request, novelty and inventive step

1. Figure 7 of document D1 discloses a voltage regulating circuit having the features of the preamble of claim 1 as filed on 23 January 2024 (i.e. claim 1 of the main request, hereinafter "claim 1"). That is not disputed by the appellant.

2. The circuit of figure 7 of D1 includes a "*Spannungs erhöhende Schaltung* 22B" (see paragraph [0129]) which corresponds to the "voltage boosting unit" of claim 1. The terminals marked 18a and 18b in figure 7 of D1 correspond to the "output ends of the voltage boosting unit" mentioned in the characterising portion of claim 1.

3. Figure 7 of D1 shows a series-connected arrangement of a MOS-FET switch 66 and a secondary winding of a transformer 50 that is connected between the terminals 18a and 18b.

4. The MOS-FET switch 66 can be considered to be a "short-circuit switch", as its drain and source would be short-circuited when the switch is closed. Furthermore, it is disclosed in paragraph [0133] of D1 that when the MOS-FET 66 is switched on (i.e. closed), if at least one on-board electrical device 16 is put into operation, a direct current of the source voltage Vbat is conducted from the battery 14 to the on-board electrical device 16 through the secondary coil of the isolating transformer 50 and the drain and source of the MOS-FET 66. It is clear from this disclosure and

the circuit arrangement of figure 7 that the closing of the MOS-FET 66 enables the voltage output by the voltage boosting unit (i.e. at the terminals 18a, 18b) to become zero, at least once the capacitor 58 has discharged through the same route.

5. Both the MOS-FET switch 66 and the secondary winding of the transformer 50 may be considered to be "disposed between" the terminals 18a and 18b. The expression "disposed between" is a rather broad definition of the arrangement which by itself would not imply that the switch is directly connected between the output ends of the voltage boosting unit, nor that it is able to short-circuit the output ends of the voltage boosting unit.

6. However, the characterising portion of claim 1 further specifies that "**when the short-circuit switch (121, 22) is controlled to be closed by the switching control unit (13), the output ends of the voltage boosting unit (12) are short-circuited.**" This feature is not present in the arrangement of figure 7 of document D1. There, when the MOS-FET switch 66 is closed, it causes the secondary winding of the transformer 50 to be connected between the output ends of the voltage boosting unit, rather than forming a short circuit between them. Hence, this feature of claim 1 is novel over the arrangement disclosed in figure 7 of document D1.

7. None of the other documents D2 to D4 cited in the European search report discloses a voltage regulating circuit similar to that claimed with a short-circuit switch disposed between output ends of a voltage boosting unit such that when it is controlled to be closed, the output ends of the voltage boosting unit are short-circuited. As argued by the appellant,

compared to the arrangement in figure 7 of document D1, this feature would allow the output voltage of the circuit to be clamped to that of the voltage source without having to wait for the capacitor 58 of D1 to discharge. In the board's view, that advantage is not rendered obvious by the available prior art, even though it might seem trivial with hindsight of the present invention. For these reasons the invention as set out in claim 1 of the main request meets the requirements of Article 56 EPC.

Main request, amendments

8. The amendments to claim 1 of the main request do not contravene Article 123(2) EPC. In particular, the feature that the output ends of the voltage boosting unit (12) are short-circuited when the short-circuit switch (121, 22) is closed is directly and unambiguously derivable from paragraphs [0019] and [0039] of the application as originally filed.

Main request, conclusion

9. For the reasons set out above the Board came to the conclusion that the main request meets all requirements of the convention and so can proceed to grant.

10. The Board is not competent to issue a communication pursuant to Rule 71(3) EPC itself, but is able to accede to the appellant's auxiliary procedural request to remit the case to the Examining Division with an order to that effect.

11. The appellant's request for oral proceedings was only for the case that the Board did not intend to grant a patent on the basis of main request. As the present

decision orders grant on the basis of the current main request, the Board was able to take the decision in writing without holding oral proceedings.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the examining division with order to grant a patent in the following version:
Description:
- Pages 1, 2, 2b, 3, 11 filed on 27 January 2016
- Page 2a filed on 23 January 2024
- Pages 4 to 10 filed with entry into the European phase before the EPO

Claims:
- Numbers 1 to 6 filed on 23 January 2024

Drawings:
- Sheets 1/5-5/5 filed with entry into the European phase before the EPO

The Registrar: The Chairman:

U. Bultmann R. Lord

Decision electronically authenticated