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**Datasheet for the decision
of 12 October 2018**

Case Number: T 2587/12 - 3.4.01

Application Number: 06765688.4

Publication Number: 1886262

IPC: G06K19/07

Language of the proceedings: EN

Title of invention:

TRANSPONDER WITH AN IMPROVED VOLTAGE LIMITER CIRCUIT

Patent Proprietor:

NXP B.V.

Opponent:

Infineon Technologies AG

Headword:

Voltage Limiter / NXP

Relevant legal provisions:

EPC 1973 Art. 54

Keyword:

Novelty - (no)



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Case Number: T 2587/12 - 3.4.01

D E C I S I O N
of Technical Board of Appeal 3.4.01
of 12 October 2018

Appellant: Infineon Technologies AG
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Decision under appeal: **Interlocutory decision of the Opposition**
Division of the European Patent Office posted on
29 October 2012 concerning maintenance of the
European Patent No. 1886262 in amended form.

Composition of the Board:

Chairman P. Scriven
Members: P. Fontenay
R. Winkelhofer

Summary of Facts and Submissions

I. The appeal is against the interlocutory decision of the Opposition Division to maintain European patent No. EP-B-1 886 262 in an amended form.

II. The Opposition Division held that the subject-matter of independent claims 1, 7, and 8 of the main request met the requirements of patentability. Concretely, the Opposition Division considered that the claimed subject-matter was new in view of documents

D8: DE-T2-697 02 065 and
D9: DE-A-197 45 310,

and that the claimed invention did not result in an obvious manner from D8, which it took to represent the closest prior art.

The Opposition Division disregarded documents D10 and D11 as evidence of a prior use, and also did not consider the ground of insufficiency of disclosure, because it had been raised after the expiry of the opposition period and was directed against claim 2 as granted.

A late objection regarding added subject-matter was rejected in its substance.

III. The appellant (opponent) filed an appeal against the decision and requested that the Opposition Division's decision be set aside and that the patent be revoked.

IV. The appellant maintained all the objections raised during the Opposition proceedings. In particular, the objections regarding lack of novelty or inventive step of the subject-matter of claim 1 (Articles 100(a), 54, and 56 EPC) with regard to document D8, were reiterated. Moreover, with regard to amended claims 8 and 9, the appellant held that the Opposition Division should also have examined whether said claims met the requirements of Article 84 EPC as to clarity.

As the appellant did not amend its requests in the course of appeal proceedings, the above reflects the appellant's final requests.

V. The respondent requested that the appeal be dismissed in its entirety or, in the alternative, that the case be remitted to the opposition division. These are also the respondent's final requests.

VI. The respondent's argument can be summarised as follows.

With regard to the objection of lack of novelty, it was argued that the feature according to which "*the internal voltage limiter circuit is adapted to continuously change the antenna voltage ...*" was absent from D8. This feature prevented glitches and disturbances when switching between operational modes. This solution to the problem would not have been obvious from D8.

In the respondent's view, the patent specification made it clear that the term "*continuously change*", in claim 1, should not be given its mathematical meaning. The skilled person was an electronics engineer who would

have recognised that the change between the two voltage limits could not be discontinuous in the mathematical sense. The claims should be read in the light of the description which provided ample support (cf. paragraph [0027]) for the intended meaning of "continuous change" as a non-abrupt change resulting in a "smooth" transition between the two voltages.

VII. Oral proceedings before the Board took place on 12 October 2018, in the presence of the appellant. The respondent was not represented.

VIII. Claim 1 of the respondent's sole substantive request reads:

A transponder (400) comprising an antenna (401) and an antenna voltage limiter circuit (404) adapted to limit an antenna voltage to a first voltage limit (VPEAK1) when the transponder (400) is in a first operation mode (504) and to a second voltage limit (VPEAK2) when the transponder (400) is in a second operation mode (505), wherein the first operation mode (504) is a receiving mode in which the transponder (400) receives data, and the second operation mode (505) is a sending mode in which the transponder (400) sends data, wherein the antenna voltage is limited to an upper limit, wherein the first voltage limit (VPEAK1) is lower than the second voltage limit (VPEAK2),

characterised in that the antenna voltage limiter circuit (404) is adapted to continuously change the antenna voltage between the first voltage limit (VPEAK1) and the second voltage limit (VPEAK2) when the transponder (400) changes between the first operation mode (504) and the second operation mode (505).

Reasons for the Decision

The respondent's main request - Novelty

1. The parties, and the Opposition Division, agree that D8 discloses a transponder with an antenna L_R and an antenna voltage limiter circuit 10 (cf. page 5, lines 13-17). The voltage limiter is adapted to limit an antenna voltage to a first upper voltage limit when the transponder is in a first (receiving) mode, and to a second upper voltage limit when the transponder is in a second (transmitting) mode (cf. page 5, lines 25-30). The first voltage limit is lower than the second (cf. page 11, lines 13-32, figures 6A-6D, 7A, 7B). The Board concurs.
2. Claim 1 further requires that the antenna voltage limiter circuit be adapted to continuously change the antenna voltage limit between the first and second limits when the transponder changes between the first and second modes.

3. The circuit disclosed in D8 presents asymmetrical behaviour, depending on whether it changes from the first to the second operation mode or, on the contrary, from the second to the first operational mode.

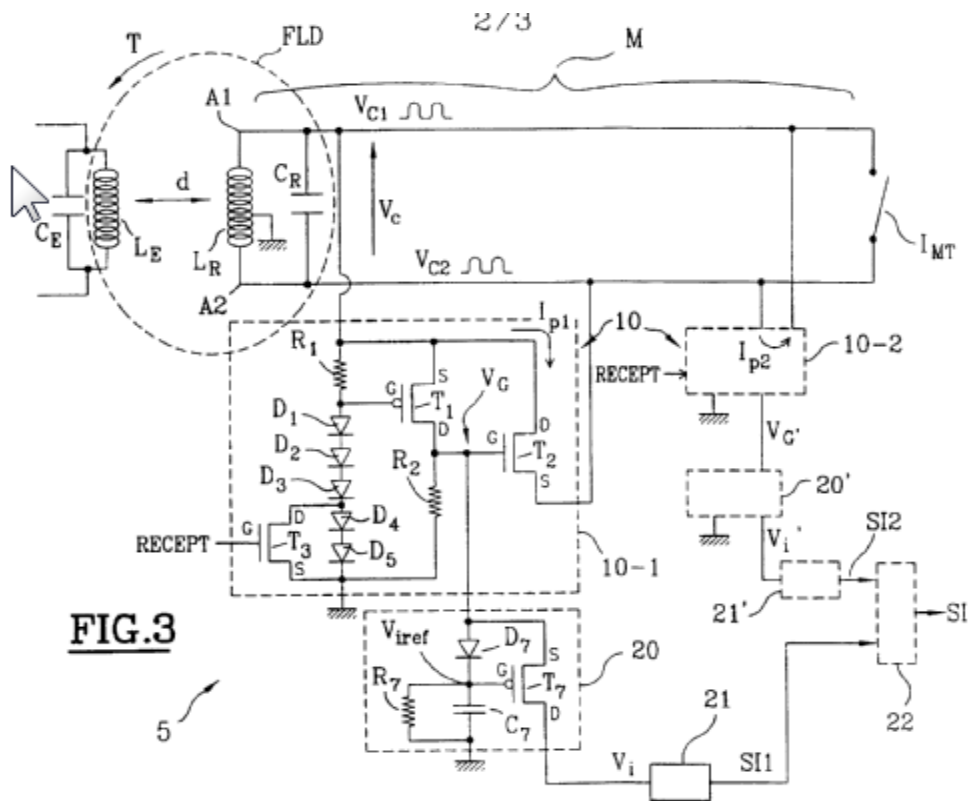


Figure 3 of D8

4. As illustrated in Figure 3 of D8, transistor T3 permits the shunting of diodes D4 and D5, thus limiting the antenna potential (across coil L_R) to a value of 4V (8V peak to peak) when receiving data, or 9V (18V peak to peak) when transmitting data (cf. D8 page 11, line 13 - page 12, line 7). The switching operation resulting from the control signal RECEPT changing from 1 to 0 will, firstly, have the effect that no current will flow through resistor R1 with the consequence that no leakage current I_{p1} flows through resistor T2. As a consequence, the energy received by the coil L_r will

accumulate in the resonating circuit $L_R C_R$. This continues until the total energy in the resonator, which fluctuates between the capacitor and the coil, reaches the value $C_R U^2 / 2$, with U corresponding to the potential of diodes D1 to D5 (9V) in series. The same process takes place in the corresponding circuit 10-2.

5. Essential for the issue at hand is the fact that the energy stored in the transponder increases with each cycle of the electromagnetic field generated by the emitter coil L_E and received by the receiver coil L_R until the above mentioned condition is met. From this moment, additional energy is diverted via voltage limiters 10-1 and 10-2 to the flow of current I_{p1} .
6. This process thus reproduces the characterising features of claim 1. This applies even when the term "*continuously change*" is given the restricted meaning of a non-abrupt and smooth transition suggested by the respondent. The process described above leads to a transition with a slope between the two voltage limits that is defined by the amount of energy stored by the $L_R C_R$ resonating circuit during each cycle of the electromagnetic field generated by the emitter coil L_E .
7. In the Board's judgement, the claim's wording does not specify whether the continuity condition should be met for all transitions, that is both when the transponder changes from the sending to the receiving mode and from the receiving to sending mode. For this reason, the fact that the condition is met in D8 when the transponder changes between the first to the second mode is sufficient to anticipate the recited feature.
8. However, even if it were argued, in favour of the respondent, that the content of the application as a

whole implies that the term "*continuously change*" is to be construed as relating to a smooth transition between the two voltage limits, independently of the kind of transition actually taking place, the same conclusion would apply.

9. A transition from 0 to 1 of the control signal RECEIPT allows the system of D8 to change from a sending mode to a receiving mode, that is, from a mode operating at a high potential (9V) to a mode operating at a lower potential (4V). As a consequence of the large amount of energy stored in the resonating circuit $L_R C_R$, a high leakage current I_{p1} flows through resistor T2. This undoubtedly leads to a rather rapid drop from the second higher limit to the first lower limit, at least when compared with the time required for the opposite transition. The time required for this fast transition is undoubtedly shorter than the 300 μs required for the embodiment of figure 5 of the application.

10. The claim wording does not provide, however, any indications as to the dynamic involved in said transition. Even if the application as a whole suggests that said transition should be smooth enough to avoid disturbances, it is devoid of any indication regarding the degree of "smoothness". In other terms, nothing in the application appears to provide any quantitative information as to the slope of the curve depicting the drop in potential between the second and first voltage limit.

11. As submitted by the appellant, it is certain that the antenna voltage limiter of D8 is adapted to continuously change the antenna voltage from its upper to its lower value, when giving the terms "continuously change" its mathematical meaning. This results from the

fact that the antenna voltage is defined by the potential of capacitor C_R and the very nature of a capacitor. Moreover, the loss of energy stored in the resonating circuit $L_R C_R$ is not instantaneous, but requires some time as a consequence of the inertia resulting from the circuit configuration. The process eventually allowing current I_{p1} to leak involves the trigger, in cascade, of transistors T3, T1 and T2. A further reason for the inertia resulting from the control process is that the conductance of transistor T2, which directly controls leakage current I_{p1} , depends on the value of the potential V_g applied to its gate; the amount of I_{p1} increasing with said potential thus contributing, to a certain degree, to a further smoothing of the discharging process of the capacitor C_r .

12. It follows that the upper limit of the antenna potential will require a certain time delay to change from its higher to its lower value. This occurs as a consequence of the various processes taking place in the circuit of D8.
13. In the absence of any indication in the application defining the dynamic involved, the Board concludes that the antenna voltage limiter circuit of D8 is also adapted to continuously change the antenna voltage from the second to the first voltage limit when the transponder changes between the second operation mode and the first operation mode.
14. The transponder of D8 reproduces all features of claim 1 in combination. The subject-matter of claim 1 is therefore not new in the sense of Article 54 EPC.

15. The respondent's sole substantive request is, therefore, not allowable and the patent must be revoked.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:



R. Schumacher

P. Scriven

Decision electronically authenticated