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**D E C I S I O N**  
**of 19 May 1998**

**Case Number:** T 0043/96 - 3.5.2

**Application Number:** 90112566.6

**Publication Number:** 0407848

**IPC:** H03H 3/00

**Language of the proceedings:** EN

**Title of invention:**

Trimming circuit and trimming method performable using such a trimming circuit

**Applicant:**

TEXAS INSTRUMENTS DEUTSCHLAND GMBH

**Opponent:**

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**Headword:**

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**Relevant legal provisions:**

EPC Art. 54, 56, 111(1)

**Keyword:**

"Main request not allowable (inventive step denied)"  
"Remittal to the department of first instance for further prosecution on the basis of the subsidiary request"

**Decisions cited:**

-

**Catchword:**



Case Number: T 0043/96 - 3.5.2

**D E C I S I O N**  
of the Technical Board of Appeal 3.5.2  
of 19 May 1998

**Appellant:** TEXAS INSTRUMENTS DEUTSCHLAND GMBH  
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**Representative:** Schwepfinger, Karl-Heinz, Dipl.-Ing.  
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**Decision under appeal:** Decision of the Examining Division of the  
European Patent Office posted 25 July 1995  
refusing European patent application  
No. 90 112 566.6 pursuant to Article 97(1) EPC.

**Composition of the Board:**

**Chairman:** W. J. L. Wheeler  
**Members:** M. R. J. Villemin  
B. J. Schachenmann

## Summary of facts and submissions

- I. The Appellant contests the decision of the Examining Division to refuse European patent application No. 90 112 566.6. The reason given for the refusal was that the subject-matter of the claims then on file was not new or did not involve an inventive step, having regard to documents:
- D1: FR-A-2 591 753 and
- D2: Patent Abstracts of Japan, vol. 3, No. 155 (E-160), 19 December 1979; & JP-A-54 134 546.
- II. With the interlocutory decision of the Board dated 5 July 1996 the Appellant was re-established in his rights in respect of the time limit for filing the statement setting out the grounds of appeal.
- III. With the statement setting out the grounds of appeal the Appellant filed a main request and a subsidiary request.
- IV. In a communication to the Appellant the Board cited the further document:
- D3: "The Penguin dictionary of ELECTRONICS", second edition (1988), pages 474 and 475.
- V. In reply to the communication from the Board, the Appellant filed a new claim 1 for the main request with the letter dated 26 January 1998.

VI. Claim 1 of the main request is worded as follows:

"A passive transponder trimming circuit for adjusting a desired value of the resonant circuit comprised of an inductor and a plurality of subcomponents (22.1 - 22.n) which are connected in parallel with each other and the values of which are in a predetermined relationship to each other, wherein into a supply line to each subcomponent (22.1 - 22.n) at least one electrically programmable field effect transistor (26.1 - 26.n) is inserted that can individually be put permanently into a conductive or non-conductive state via a voltage applied to a control gate terminal, thereby tuning the resonant frequency of the resonant circuit to a desired value."

Claim 1 of the subsidiary request filed with the statement of grounds of appeal is worded as follows:

"Method of trimming an electrical parameter of an assembly by connecting an electrical component made up of a plurality of subcomponents (22.1 - 22.n) and of a reference component (24) which are connected in parallel with each other and the values of which are in a predetermined relationship to each other, wherein into a supply line to each subcomponent (22.1 - 22.n) and of said reference component (24) at least one electrically programmable field effect transistor (26.1 - 26.n, 28) is inserted which via a control gate terminal can be put permanently into a conductive state or a non-conductive state, characterized in that all

the subcomponents (22.1 - 22.n) and a reference component (24) are rendered effective in that the field effect transistors (26.1 - 26.n, 28) inserted into one of their supply lines are put into the conductive state, that the trimming circuit (10) is connected to the assembly (14) and the actual value of the electrical parameter to be adjusted and the deviation thereof from a desired value are determined, that the reference component (24) is rendered ineffective by blocking the field effect transistor (28) inserted into the supply line thereof, that the change of the electrical parameter of the assembly (14) caused by rendering the reference component (24) ineffective is measured, that from the measurement result the magnitude of the value of the subcomponents (22.1 - 22.n) which is to be rendered effective to change the electrical parameter of the assembly (14) to be adjusted from the actual value to the desired value is calculated and that the field effect transistors (26.1 - 26.n) are blocked in as many supply lines to the subcomponents (22.1 - 22.n) as is necessary to reach the calculated value of the subcomponents (22.1 - 22.n) to be rendered ineffective."

Claim 2 of the subsidiary request filed with the statement of grounds of appeal is worded as follows:

"Method of trimming an electrical parameter of an assembly by connecting an electrical component made up of a plurality of subcomponents (22.1 - 22.n) and of a reference component (24) which are connected in parallel with each other and the values of which are in

a predetermined relationship to each other, wherein into a supply line to each subcomponent (22.1 - 22.n) and of said reference component (24) at least one electrically programmable field effect transistor (26.1 - 26.n, 28) is inserted which via a control gate terminal can be put permanently into a conductive state or a non-conductive state, characterized in that in the trimming circuit (10) all the subcomponents (22.1 - 22.n) and the reference component (24) are rendered ineffective in that the field effect transistors (26.1 - 26.n, 28) inserted into one of their supply lines are put into the blocked state, that the trimming circuit (10) is connected to the assembly (14) and the actual value of the electrical parameter to be adjusted and the deviation thereof from a desired value are determined, that the reference component (24) is rendered effective by rendering conductive the field effect transistor (28) inserted into the supply line thereof, that the change of the electrical parameters of the assembly (14) caused by rendering the reference component (24) effective is measured, that from the measurement result the magnitude of the value of the subcomponents (22.1 - 22.n) which is to be rendered ineffective to change the electrical parameter of the assembly (14) to be adjusted from the actual value to the desired value is calculated and that the field effect transistors (26.1 - 26.n) are blocked in as many supply lines to the subcomponents (22.1 - 22.n) as is necessary to reach the calculated value of the subcomponents (22.1 - 22.n) to be rendered effective."

VII. The Appellant's arguments may be summarised as follows:

Claim 1 of the main request made clear that the invention related to a passive transponder trimming circuit for adjusting a desired value of a resonant circuit. The prior art did not disclose a trimming circuit of this type. It was admitted that an electrically programmable field effect transistor which can be put permanently into a conductive or non-conductive state by a voltage applied to a control gate terminal was known from D3. However, the invention was not directed to such a field effect transistor but to a passive transponder trimming circuit in which this type of transistor was used. An essential feature of the claimed trimming circuit was that the field effect transistors provided in the supply line to each subcomponent could individually be put permanently into a conductive or a non-conductive state.

The prior art disclosed in D2 did not allow for individually adjusting all possible states of the field effect transistors because erasing was made by exposure to ultraviolet light which caused all transistors to change their state when this irradiation was carried out. The Board's objection that it was obvious to the skilled person to replace the floating gate transistors of the circuit known from D2 by floating gate transistors provided with a control gate terminal as taught by D3 could only be raised with knowledge of the claimed solution.

VIII. The Appellant requested that the decision under appeal be set aside and a patent be granted on the basis of

the application in the form according to the main request, namely:

**Claims:**

No. 1 filed with the letter dated 26 January 1998,  
No. 2 to 7 as originally filed.

**Description:**

Page 2 and page 2a as insert to page 2, filed with the grounds of appeal dated 4 December 1995 (received 5 December 1995);  
page 1 and pages 3 to 8 as originally filed.

**Drawings:**

Single figure as originally filed.

IX. Should the main request be rejected, the Appellant asked for grant of a patent on the basis of the application in the form according to the subsidiary request, namely:

**Claims:**

No. 1 and 2 (Subsidiary Request) filed with the grounds of appeal dated 4 December 1995 (received 5 December 1995).

**Description:**

Pages 1 to 4 (Subsidiary Request), filed with the grounds of appeal dated 4 December 1995 (received 5 December 1995);  
pages 5 to 8 as originally filed.

**Drawings:**

Single figure as originally filed.

- X. In the notice of appeal, the Appellant requested oral proceedings should the Board intend to reject the appeal.

### **Reasons for the decision**

- 1. The appeal is admissible.
- 2. *Main request*
  - 2.1 Claim 1 of the main request differs from the version of claim 1 rejected by the examining division *inter alia* in that it is directed to "a passive transponder" trimming circuit. In the letter dated 26 January 1998 the Appellant pointed out that, according to claim 1 of the new main request, the trimming circuit was used in "a passive transponder, namely a transponder which has no built-in energy source". Reference was made in this connection to paragraph 4 on page 4 of the description. However, at that place, neither a "passive" transponder nor a transponder without built-in energy source is disclosed. Thus doubts could be raised as to whether this feature was already contained in the original application. However, this issue does not need to be decided here since, in the Board's view as substantiated in the following, the subject-matter of claim 1 does not involve an inventive step.
  - 2.2 There was no reference to a transponder or a passive

transponder in the claims on file when the European Search Report was drawn up, and, consequently, there is no prior art document on the file relating to tuning the resonant frequency of a resonant circuit in a passive transponder. However, passive transponders were very well known in the 1980s before the priority date claimed for the patent in suit and their use in object identification systems was also very well known then. Furthermore, it was well known for the resonant circuit of the output stage of the transmitter of a passive transponder to include an inductor and that the resonant frequency of the resonant circuit had to be tuned as exactly as possible to the frequency of the signal to be transmitted.

2.3 This general knowledge in the art was so well known to persons skilled in the art that it is beyond reasonable dispute and must also be known to the Appellant, so that, even in the absence of documentation on file, the Board takes it as known.

2.4 Starting from this prior art, the problem solved by the subject-matter of claim 1 of the main request is to provide a trimming circuit for adjusting the resonant frequency of a resonant circuit in a passive transponder, which trimming circuit can be made in the form of an integrated circuit, and in which the adjusting operation can be carried out solely by applying electrical signals. This statement of the problem is consistent with the broader problem discussed in the third paragraph of the description of the present application, when restricted to a trimming

- circuit for adjusting the resonant frequency of a resonant circuit in a passive transponder.
- 2.5 Document D1 discloses a circuit (see page 3, line 28 to page 6, line 14; page 7, lines 3 to 19; figures 1A et 1B) for adjusting in a digital to analogue converter the relative values of a plurality of capacitors (14, 16, 18) by means of respective pluralities of adjusting capacitors (20-24; 26-32; 34-42) which are connected in parallel with each other, in order to bring the values of the capacitors (14, 16, 18) into a binary weighted relationship to each other, wherein into a supply line to each adjusting capacitor, a MOSFET (46-70) is inserted that can individually be switched into a conductive or a non-conductive state by electrical signals applied to its gate during an autocalibration routine.
- 2.6 Document D2 discloses a trimming circuit for adjusting, in a digital to analogue converter, the desired value of the total capacitance of a plurality of correcting capacitors (12, 13, 14) which are connected in parallel with each other, wherein into a supply line to each correcting capacitor a respective electrically programmable IGFET (15, 16, 17) is inserted that can individually be put permanently into a conductive or non-conductive state according to the charge on its floating gate.
- 2.7 It is textbook knowledge, see Document D3 (pages 474 and 475), that in an electrically alterable read-only memory (EAROM) each memory cell comprises a transistor

having a floating gate and a control gate placed above the floating gate and connected to a terminal for applying electrical switching signals for charging or discharging the floating gate to place the transistor in a conductive or non-conductive state.

2.8 Furthermore, it is acknowledged in the second paragraph of the description of the present application, that it was already known to provide a trimming capacitor in parallel with the resonant circuit of a transmitter output stage and to set its value such that the desired resonant frequency of the resonant circuit is achieved.

2.9 A person skilled in the art who had to solve the problem of providing a passive transponder with a trimming circuit as stated in paragraph 2.4 above, would of course be aware of the general knowledge in the art mentioned in paragraphs 2.7 and 2.8 above. On reading Documents D1 and D2 in the light of his general knowledge, he would see that there lies a good solution to his problem. He should provide the resonance circuit with a plurality of trimming capacitors of different known values, each in series with an electrically alterable FET. Following this obvious path he would come to the claimed solution without having to make any inventive step within the meaning of Article 56 EPC. It is noted that no unexpected advantage or effect resulting from the particular use of the trimming circuit in a "passive" transponder has been invoked by the Appellant, nor can any be found in the original disclosure.

2.10 It follows that the main request cannot be allowed.

3. *Subsidiary request*

3.1 The present application was rejected on the ground that originally filed claim 1 was not allowable under Article 52(1) EPC and that it was not apparent which part of the application could serve as a basis for a new allowable claim.

3.2 Claims 1 and 2 of the present subsidiary request both concern a method of trimming an electrical parameter and were not dealt with in the decision under appeal. They differ from originally filed claims 6 and 7 in that they are now drafted as independent claims, but their subject-matter is essentially the same. The decision under appeal implies that originally filed claims 6 and 7 were not valued as part of the application which could have served as a basis for a new allowable claim. Some reasons for refusing them had been given in the first communication of the examining division dated 9 November 1993 to the Applicant (see in particular paragraph 2.18). However, these reasons were merely based on alleged general knowledge of the skilled person and, without further substantiation, cannot convince the Board that these claimed methods were obvious, because the general knowledge concerning the method alleged in the communication is not as notorious as that invoked by the Board in paragraphs 2.2 and 2.3 above. Nor do the claimed methods appear to be obvious in view of the method described in document D1 (see D1, page 7, line 9 to page 9, line 25) for obtaining a series of binary weighted capacitance values (see page 3, line 7 to 17 and page 5, lines 12 to 18) in an adjusting circuit used in digital to analogue converter. Such reasons given in the communication are not sufficient to remedy the lack of reasoning concerning these claims 6 and 7 in the decision under appeal itself.

- 3.3 In order to afford the Appellant the opportunity of being able to prosecute the subsidiary request before two instances, the Board makes use of its power under Article 111(1) EPC to remit the case to the department of first instance for further prosecution on the basis of the subsidiary request submitted with the letter setting out the grounds of appeal, dated 4 December 1995.
4. Since the Board is not rejecting the Appellant's subsidiary request, oral proceedings, which were requested in the notice of appeal, last paragraph, need not to be held, in view of the statement of grounds, page 3, fifth complete paragraph: "If the appeal board does not comply with the applicant's main request, the applicant limits the application to the method defined in originally filed claims 6 and 7."

## **Order**

### **For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The main request is refused.
3. The case is remitted to the department of first instance for further prosecution on the basis of the subsidiary request submitted with the letter setting out the grounds of appeal (see section IX above).

The Registrar: The Chairman:

M. Kiehl

W. J. L. Wheeler