BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

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File Number: T 0925/92 - 3.5.2

Application No.: 87 308 927.0

Publication No.: 0 271 190

Title of invention: Superregenerative detector

Classification: H03D 11/04

D E C I S I O N
of 18 May 1993

Applicant: R.F. Monolithics, Inc.

Headword:

EPC Article 56

Keyword: "Inventive step - yes, after amendment"

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number : T 0925/92 - 3.5.2

D E C I S I O N
of the Technical Board of Appeal 3.5.2
of 18 May 1993

Appellant : R.F. Monolithics, Inc.
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Representative : Rackham, Stephen Neil
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Decision under appeal : Decision of the Examining Division of the European Patent Office dated 13 April 1992 refusing European patent application No. 87 308 927.0 pursuant to Article 97(1) EPC.

Composition of the Board :

Chairman : R.E. Persson
Members : W.J.L. Wheeler
M.R.J. Villemin

Summary of Facts and Submissions

I. The present appeal contests the decision of the Examining Division refusing Appellant's European patent application No. 87 308 927.0. The reason for the refusal was that the claimed subject-matter did not involve an inventive step. The following prior art documents were considered:

D1: FR-A-2 209 255
D2: US-A-4 143 324
D3: EP-A-0 184 508.

II. During oral proceedings on 18 May 1993, the Appellant filed amended Claims 1 to 3. Claim 1 is now worded as follows:

"A self-quenching superregenerative detector comprising an RF oscillator (Q_1, L_3, C_7) having an output and an input; a feedback loop for coupling the output to the input to cause the RF oscillations to occur; and, a quench oscillator (C_7, L_3) coupled to the RF oscillator for switching the RF oscillator between an oscillating and a non-oscillating condition; characterised by a surface acoustic wave delay line device (22) in the feedback loop, the device (22) being a single phase unidirectional transducer formed on a piezoelectric substrate with electrodes a quarter of a wavelength wide, and having a low insertion loss, and a low Q."

Claims 2 and 3 are dependent on Claim 1.

III. The Appellant argued essentially that it was accepted that it was obvious to try to use a SAW device in the feedback loop of a self-quenching superregenerative oscillator, but previous attempts to do this had been abandoned without success. A signed statement from

Mr. Hartmann was filed in support of this. Part of the present invention lay in the analysis of the properties that the SAW device was required to have, namely low loss and a low Q. These properties were possessed by single phase unidirectional transducers (SPUDTs), described in the Appellant's earlier patent applications GB-A-2 168 212 and EP-A-0 255 263 referred to on pages 9 and 10 of the present application. These SPUDTs had been known to the Appellant for two years before it was recognised that they were suitable for use in the feedback loop of self-quenching superregenerative oscillators.

IV. The Appellant requested that the decision under appeal be set aside and a that patent be granted on the basis of the following documents:

Claims 1 to 3 as filed during the oral proceedings;

Description, pages 1, 2, 4, 6 to 8 and 12 to 14 as originally filed;
pages 3, 9 and 10 as filed with the letter dated 18 December 1991 (received 20 December 1991); and
pages 5 and 11 as filed during the oral proceedings;

Drawings, Figures 1 to 7 as originally filed.

Reasons for the Decision

1. The appeal is admissible.

2. Claim 1 is now limited to the embodiment according to dependent Claim 3 of the claims refused by the Examining Division, with the further limitation that the detector is self-quenching and that the SAW delay line device has

a low Q. As described on page 9 of the application as originally filed, the SAW device will function properly as a feedback device only if it has a low loss in the circuit and a low Q. In the opinion of the Board, the amendments comply with Article 123(2) EPC.

3. Self-quenching superregenerative detectors of the type specified in the prior art part of Claim 1 were already generally known, as discussed in the introductory part of the description of the present application. Examples of such detectors are disclosed in US-A-4 143 324 (D2).

4. As explained in the introductory part of the description of the present application, the known superregenerative detectors were simple and economical but were temperature unstable and suffered from drift. There was a recognised need for improvement.

5. It was also already known that surface acoustic wave (SAW) delay line devices were very temperature stable and one had already been used in the feedback circuit of an RF oscillator, see US-A-3 868 595 (corresponding to D1: FR-A-2 209 255). It is noted that that oscillator was not self-quenching and there is no hint that the SAW delay line device disclosed there could be used in the feedback loop of a self-quenching superregenerative oscillator.

6. Attempts had already been made to improve the stability of a self-quenching superregenerative detector by using a SAW device in its feedback loop. It appears that those attempts were unsuccessful because the insertion losses of the SAW devices tried were so high that sufficient feedback could not be obtained with a single transistor oscillator, or their Q was so high that quenching was difficult, so that the advantages of superregenerative detectors, namely their simplicity and economy, were

lost. According to Mr. Hartmann's statement, attempts had been made by eminent experts in the field, but had been abandoned as they did not see any way of overcoming the difficulties.

7. Single phase unidirectional transducers (SPUDTs) formed on a piezoelectric substrate with electrodes a quarter of a wavelength wide are disclosed in the Appellant's own patent application GB-A-2 168 212 (corresponding to D3: EP-A-0 184 508). There it is disclosed that the SPUDTs have lower insertion losses than previously available SAW devices and they can be used effectively with convolvers, resonators and filters of all types, especially highly selective bandpass filters in front-end receivers. There is no hint that any of the SPUDTs disclosed there could be used in a self-quenching superregenerative oscillator. Although these patent applications were published only about six months before the priority date of the present application, their contents had been known to the Appellant for at least eighteen months beforehand. Thus it appears that the Appellant took about two years to recognise that some of the SPUDTs described there were suitable for use in the feedback loop of a self-quenching superregenerative oscillator.

8. In view of the recognised need mentioned in paragraph 4 above, the previously unsuccessful attempts mentioned in paragraph 6 above and the fact that it took two years to realise that the SPUDTs disclosed in D3 could be used to overcome the difficulties, the Board considers that it was not obvious to try again with the D3 SPUDTs.

9. It is noted in passing that the SPUDTs disclosed in the Appellant's earlier patent application EP-A-0 255 263, which was published after the filing date of the present

application, are not to be considered in deciding whether there has been an inventive step.

10. Thus, the Board concludes that the subject-matter of the present claims involves an inventive step within the meaning of Article 56 EPC.

Order

For these reasons, it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to grant a patent as requested by the Appellant.

The Registrar: The Chairman:

M. Kiehl E. Persson