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**Datasheet for the decision  
of 28 November 2017**

**Case Number:** T 2585/16 - 3.5.03

**Application Number:** 07872651.0

**Publication Number:** 2033345

**IPC:** H04B17/00, G01R29/08

**Language of the proceedings:** EN

**Title of invention:**  
TRANSIENT RF DETECTOR AND RECORDER

**Applicant:**  
HPM Security Associates Limited Partnership

**Headword:**  
Transient RF detector/HPM

**Relevant legal provisions:**  
EPC Art. 56

**Keyword:**  
Inventive step (all requests) - no

**Decisions cited:**

**Catchword:**



**Beschwerdekammern**

**Boards of Appeal**

**Chambres de recours**

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Case Number: T 2585/16 - 3.5.03

**D E C I S I O N**  
**of Technical Board of Appeal 3.5.03**  
**of 28 November 2017**

**Appellant:** HPM Security Associates Limited Partnership  
(Applicant) 500 Business Center Drive  
Pittsburgh, PA 15205-1333 (US)

**Representative:** Barton, Matthew Thomas  
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**Decision under appeal:** **Decision of the Examining Division of the  
European Patent Office posted on 27 June 2016  
refusing European patent application No.  
07872651.0 pursuant to Article 97(2) EPC.**

**Composition of the Board:**

**Chairman** F. van der Voort  
**Members:** T. Snell  
S. Fernández de Córdoba

## **Summary of Facts and Submissions**

- I. This appeal is against the decision of the examining division refusing European patent application No. 07872651.0, with publication No. WO 2008/100322 A1.
  
- II. The refusal was, *inter alia*, based on the ground that the subject-matter of claim 1 respectively of a main request and auxiliary requests 2 and 3 did not involve an inventive step starting out from the closest prior art document D1 (Articles 52(1) and 56 EPC). Auxiliary request 1 was not admitted (Rule 137(3) EPC).
  
- III. The appellant filed a notice of appeal against the above decision. The appellant filed a main request and auxiliary requests M', 1, 1', 2 and 3. The main request and auxiliary requests 1, 2 and 3 were said to correspond to the requests on which the impugned decision of the examining division was based.  
  
Oral proceedings were conditionally requested.
  
- IV. In a letter dated 14 December 2016, the appellant requested accelerated prosecution of the appeal.
  
- V. In a communication accompanying a summons to oral proceedings, the board gave a preliminary opinion raising objections pursuant to Articles 84 and 123(2) EPC. With regard to inventive step, the board indicated that it would be necessary to discuss inventive step, *inter alia*, starting out from document D2 (= WO 03/083495 A1). The board also referred to the possible need to discuss the combination of documents D2 and D8 (= WO 96/41203 A1).

VI. With a letter of response to the board's communication, dated 11 October 2017, the appellant submitted claims of a new main request, auxiliary request 1', and auxiliary request 3, which, if admitted, were to replace all the existing requests. The requests were said to take account of the board's comments regarding Articles 84 and 123(2) EPC.

VII. Oral proceedings were held on 28 November 2017.

In response to several objections raised by the board, the appellant submitted an amended main request.

The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the claims of an amended main request as filed during the oral proceedings or, in the alternative, one of auxiliary requests 1' and 3, as filed with the letter dated 11 October 2017.

At the end of the oral proceedings, after due deliberation, the chairman announced the board's decision.

VIII. Claim 1 of the **main request** reads as follows:

"A portable device (10) for detecting a predefined radio frequency (RF) transmission of electromagnetic radiation, the portable device comprising:

a housing (12);

a controller (16) situated within the housing;

a storage medium (18) communicatively connected to the controller; and

an antenna (20) connected to the controller and configured to receive the predefined RF transmission, wherein the antenna comprises monopole antenna elements (30a, 30b), and wherein each of the monopole antenna elements is connected to a circuit node between a respective pair of detector diodes that are connected in series from a signal ground plane to an input of a high impedance amplifier, and wherein a shunt capacitor is connected from the input of the high impedance amplifier input [sic] to signal ground; such that the predetermined RF signal received by each monopole antenna element is rectified and the rectified signal of the monopole [sic] antenna element receiving a highest RF signal is passed on to the high impedance amplifier input without significant loading by the other monopole antenna element or elements, and wherein a signal output from the high impedance amplifier is available for further signal processing; and

an audio-generating component (24) connected to the controller;

wherein the controller is configured to:

sense at least one of magnitude, duration and repetition of the predefined RF transmission;

identify a class of the predefined RF transmission based on one of the magnitude, duration, and repetition associated with the predefined RF transmission, wherein the identifiable class of the predefined RF transmission comprises a continuous signal, pulsed signals having repetition rates substantially on an order of milliseconds, transient electromagnetic pulse signals having repetition rates substantially on an

order of seconds, and random transient electromagnetic pulse signals having no defined repetition rate; and

wherein the controller is operative to

output a visual and/or aural alert indicative of an occurrence of the identified class of the predefined RF transmission having been sensed at a threshold level of one or more threshold levels."

IX. Claim 1 of **auxiliary request 1'** reads as follows:

"A portable device (10) for detecting a predefined radio frequency (RF) transmission of electromagnetic radiation, the portable device comprising:

a housing (12);

a controller (16) situated within the housing;

a memory (18) communicatively connected to the controller; and

an antenna (20) connected to the controller and configured to receive the predefined RF transmission, wherein the antenna comprises monopole antenna elements (30a, 30b), and wherein each of the monopole antenna elements is connected to a circuit node between a pair of detector diodes that are connected in series from a signal ground plane to an input of a high impedance amplifier, and wherein a shunt capacitor is connected to the input of the high impedance amplifier input, and wherein the pair of detector diodes are connected to form a diode-OR connection such that a highest signal level detected by the pair of detector diodes is passed onto the input of the high impedance amplifier;

an audio-generating component connected to the controller, wherein the controller is configured to:

receive the predefined RF transmission;

sense at least one of magnitude, duration and repetition of the predefined RF transmission;

identify a class of the predefined RF transmission based on one of the magnitude, duration, and repetition associated with the predefined RF transmission, wherein the identified class of the predefined RF transmission comprises one of a continuous signal, pulsed signals having repetition rates substantially on an order of milliseconds, transient signals having repetition rates substantially on an order of seconds, and random signals having no defined repetition rate; and

causing the audio-generating component to output one or more tones of at least one predefined frequency, predefined duration, and predefined repetition associated with the identified class of the predefined RF transmission, whereby the one or more outputted tones provide aural discrimination of the class of the predefined RF transmission received by the portable device."

X. Claim 1 **auxiliary request 3** reads as follows:

"A portable device (10) for detecting a predefined radio frequency (RF) transmission of electromagnetic radiation, the portable device comprising:

a housing (12);



a controller (16) situated within the housing;

a memory (18) communicatively connected to the controller; and

an antenna (20) connected to the controller and configured to receive the predefined RF transmission; and

an audio-generating component connected to the controller, wherein the controller comprises means for:

sensing at least one of magnitude, duration and repetition of the predefined RF transmission;

identifying a class of the predefined RF transmission based on one of the magnitude, duration, and repetition associated with the predefined RF transmission; and

causing the audio-generating component to output one or more tones of at least one of predefined frequency, predefined duration, and predefined repetition associated with the class of the predefined RF transmission, whereby the one or more outputted tones provide aural discrimination of the class of the predefined RF transmission received by the portable device; and

characterized in that the antenna comprises a first monopole antenna element (30a) and a second monopole antenna element (30b) oriented along a substantially same plane as each other, and a third monopole antenna element (30c) arranged in substantially perpendicular relation to the first and second monopole antenna elements, wherein the controller further comprises

means for identifying a highest signal level obtained from the first, second, or third monopole antenna elements, wherein the identified class of the predefined RF transmission comprises one of a continuous signal, pulsed signals having repetition rates substantially on an order of milliseconds, transient signals having repetition rates substantially on an order of seconds, and random signals having no defined repetition rate, and wherein each of the monopole antenna elements is connected to a circuit node between a pair of detector diodes that are connected in series from a signal ground plane to an input of a high impedance amplifier to provide the means for identifying the highest signal level obtained from the first, second or third monopole antenna elements, and wherein a shunt capacitor is connected to the input of the high impedance amplifier input *[sic]*".

### **Reasons for the Decision**

1. *Main request - claim 1 - inventive step*
- 1.1 The present application relates to a device for detecting electromagnetic radiation which may be harmful to electrical devices (although claim 1 is not limited to harmful radiation), such as an electromagnetic pulse (EMP). Broadly, the device includes a plurality of antenna elements, rectifier circuits for rectifying and combining the RF signals captured by the respective antennas, means for identifying a predetermined signal "class" on the basis of one or more threshold levels, and aural and/or visual means for outputting an alert.
- 1.2 Documents D2 and D8 both concern devices for detecting harmful radiation and thus would be considered by the

skilled person as belonging to the same technical field as the present application. In particular, D2 and D8 each disclose a device for detecting harmful radiation having a wideband characteristic, which is precisely the same type of signals which the device of the present application is aimed at detecting (cf. D2, the abstract and page 3, lines 32 to 34; D8, page 6, lines 21 to 23). Further, like the device of the present application, both D2 and D8 disclose a device with multiple antenna elements with a respective detector arrangement comprising a diode or diodes for rectifying the antenna signal (cf. D2, page 6, lines 6 to 16, and Fig. 2; D8, page 15, line 30 to page 16, line 11, and Figs 4 and 8). In D2, apparently there is a "diode-OR" configuration (cf. Fig. 2), and in D8, the signals from each antenna can be "joined" in the detector (cf. D8, page 16, lines 8-11). The combined signal is then analysed on the basis of a threshold analysis in order to generate an alert signal (cf. D2, page 5, line 29 to page 6, line 5; D8, page 10, lines 3 to 12 and page 6, lines 23 to 25).

- 1.3 The board adopts D2 as representing the closest prior art.

Using the wording of claim 1, D2 discloses:

A portable device for detecting a predefined radio frequency (RF) transmission of electromagnetic radiation, the portable device comprising:  
a housing (cf. page 13, lines 30 to 34);  
a controller ("threshold comparator 12"; cf. page 9, lines 1 to 25) situated within the housing;  
an antenna connected to the controller and configured to receive the predefined RF transmission, wherein the antenna comprises antenna elements (cf. page 6, lines 6

to 10), and wherein each of the antenna elements is connected to a diode connected to an input of a high impedance amplifier (cf. page 6, lines 11 to 15, and page 8, lines 24 to 29);

such that the predetermined RF signal received by each antenna element is rectified and the rectified signal of the antenna element receiving a highest RF signal is passed on to the high impedance amplifier input without significant loading by the other antenna element or elements (implicit), and wherein a signal output from the high impedance amplifier is available for further signal processing (cf. page 6, lines 15 and 16); and

an audio-generating component connected to the controller circuit (cf. page 9, lines 26 to 28);

wherein the controller circuit is configured to: sense at least one of magnitude, duration and repetition of the predefined RF transmission (here: magnitude; cf. page 9, lines 10 to 16);

identify a class of the predefined RF transmission based on one of the magnitude, duration, and repetition associated with the predefined RF transmission (idem); and

wherein the controller is operative to

output a visual and/or aural alert indicative of an occurrence of the identified class of the predefined RF transmission having been sensed at a threshold level of one or more threshold levels (idem).

- 1.4 The subject-matter of claim 1 differs from the device disclosed in D2 in the following features:

(i) the device comprises a storage medium communicatively connected to the controller;

(ii) the antenna elements are monopoles;

(iii) each of the antenna elements is connected to a circuit node between a respective pair of detector diodes that are connected in series from a signal ground plane to an input of the high impedance amplifier, and wherein a shunt capacitor is connected from the input of the high impedance amplifier input to signal ground;

(iv) the identifiable class of the predefined RF transmission comprises a continuous signal, pulsed signals having repetition rates substantially on an order of milliseconds, transient electromagnetic pulse signals having repetition rates substantially on an order of seconds, and random transient electromagnetic pulse signals having no defined repetition rate.

1.5 The main described embodiment of D2 is based on detecting when the signal strength of electromagnetic interference exceeds a predetermined threshold. However, it is further stated that "the EMI detector can be used to detect electromagnetic radiation having specific characteristics of frequency, power density and pulse width" (cf. page 15, last paragraph). A detailed solution enabling the device to detect such specific characteristics is however not provided.

The technical problem to be solved starting out from D2 may therefore be considered as being to improve the device in this respect.

1.6 In the board's view, the skilled person, starting out from D2 and faced with the above-mentioned problem, would turn to document D8, since D8 provides a solution to this problem by providing a threshold detector able to "measure the noise signal amplitude, duration, repetition rate, frequency, or any other feature of the signal" (cf. page 10, lines 3 to 7). At the same time, the skilled person would note other advantageous features disclosed in D8. The skilled person starting out from D2 and applying the teaching of D8, together with common general knowledge, would incorporate the features (i) to (iv) identified above without inventive step for the following reasons.

1.7 Re (i): D2 discloses that the comparator output signal can be input to a computer system comprising a software program which responds to the signal, albeit external to the device, or that the whole device can be implemented as a card within the computer (cf. D2, page 14, lines 9 to 14 and 34 to 35; page 15, lines 13 to 16). D8 discloses the use of a microprocessor which receives "EMI presence and strength data, to be collected and stored" (cf. D8, page 10, lines 19 to 21), i.e. there are storage means connected to a controller. The use of a program-based controller as shown in D8 inside the device instead of the more limited hardware solution (555 timer) of D2 would have been an obvious measure to improve the range of processing and storage options. It follows that the presence of a storage means connected to a controller does not contribute to inventive step, and neither did the appellant argue otherwise.

Re (ii): D2 states that any antenna having a bandwidth of at least 10 MHz to 7 GHz and having a low impedance can be employed, e.g. a folded dipole antenna (cf. D2,

page 7, lines 14 to 18). D8 suggests the use of "any appropriate form of antenna" (cf. page 6, lines 29 to 31), whereby detection of signals in the range 0.5 Hz to 2 GHz is required (cf. page 6, lines 21 to 23). The skilled person would on the basis of common general knowledge consider a monopole as an obvious alternative to a dipole, which is corroborated by the statement in the description of the present application, paragraph [0015], last sentence, which reads: "It is to be understood that the antenna may alternatively include dipole and/or monopole antenna elements". The appellant pointed out that the multiple monopole antenna elements achieved a wideband frequency sensitivity and sensitivity to a wide range of possible orientations of the incoming EM waves (cf. paragraph [0017]). However, as has been pointed out above, both D2 and D8 require antennas with wideband frequency sensitivity, and directionality is not a feature of claim 1. The wideband response of monopoles would have been well-known to the skilled person. The board concludes that this feature does not contribute to inventive step either.

Re (iii): The appellant argued that the claimed diode circuit was very specific and not obvious starting out from D2. The board notes however that the very same rectifier circuit as claimed is disclosed in D8, Fig. 4 and on page 9, lines 19 to 25. In fact, this circuit is a commonly known rectifier circuit which, compared with a simple diode, provides an output with double the amplitude, thus improving the sensitivity. The skilled person starting out from D2 would on the basis of common general knowledge and/or D8 have arrived at this circuit arrangement to provide more sensitivity, all the more so as the diode detectors and amplifier in D2 are aimed at detecting low-level signals (cf. D2, page

6, lines 6 to 16 and page 8, lines 24 to 29), as also in D8 (cf. page 6, lines 23 to 25). The board concludes that this feature does not contribute to inventive step either.

Re (iv): The types of electromagnetic signal specified in claim 1 (which in any case are only vaguely defined) are broadly the same types of electromagnetic interference signal to be detected by the devices of D2 and D8. D8 in particular is designed to detect signals having particular repetition rates and durations, as stated above (point 1.6), and D2 is designed inter alia to detect an electromagnetic pulse (cf. point 1.5 above). Consequently, the board concludes that this feature does not contribute to inventive step either. The appellant did not argue otherwise.

1.8 At the oral proceedings, the appellant argued that if the problem to be solved starting out from D2 was putatively considered to be to find an alternative solution, the skilled person is given no hint to arrive at the claimed solution without the benefit of hindsight.

The board however considers that the problem can be formulated more specifically than to find an alternative solution. As explained above, the skilled person would be led to D8 by the idea, already expressed in D2, to identify signals based on more specific characteristics than signal strength alone. The board therefore finds this argument unconvincing.

1.9 Hence the board concludes that the subject-matter of claim 1 of the main request does not involve an inventive step (Articles 52(1) and 56 EPC).



2. *Auxiliary request 1' - claim 1 - inventive step*

2.1 The only differences relevant to inventive step with respect to claim 1 of the main request are the features:

(i) "wherein the pair of detector diodes are connected to form a diode-OR connection such that a highest signal level detected by the pair of detector diodes is passed onto the input of the high impedance amplifier".

(ii) "causing the audio-generating component to output one or more tones of at least one predefined frequency, predefined duration, and predefined repetition associated with the identified class of the predefined RF transmission, whereby the one or more outputted tones provide aural discrimination of the class of the predefined RF transmission received by the portable device".

2.2 Re (i): A diode-OR connection is derivable from D2 as already discussed. The appellant did not dispute this point.

Re (ii): This feature concerns the problem of providing a suitable aural alert mechanism. This problem is independent of the problem identified above related to detecting the signals themselves and can be assessed separately for inventive step. The concept of providing different alerts for different signals is obvious having regard to D2, since here there are two different buzzers 13 and 18 which alert to the presence of different signals (low level and high level). In this respect, it would make no sense to use the same sound for both buzzers, since the user would not know which one was which. The remaining aspects of feature (ii)

concern standard aural alerts, e.g of an alarm clock. This feature therefore does not contribute to inventive step.

2.3 The board concludes that the subject-matter of claim 1 of auxiliary request 1' does not involve an inventive step either.

3. *Auxiliary request 3 - claim 1 - inventive step*

3.1 With respect to inventive step, claim 1 of auxiliary request 3 includes the following additional feature not already discussed in connection with claim 1 of the previous requests:

"the antenna comprises a first monopole antenna element (30a) and a second monopole antenna element (30b) oriented along a substantially same plane as each other, and a third monopole antenna element (30c) arranged in substantially perpendicular relation to the first and second monopole antenna elements".

3.2 D8 discloses a three-dimensional coil antenna system using an orthogonal axis system XYZ (cf. page 15, line 30 ff.). Further, instead of a coil antenna, a linear antenna outside the metal case of the device can be used (page 16, lines 32 to 34). Self-evidently, this can also apply to the three-dimensional antenna system. The skilled person starting out from D2 would, based on the teaching of D8, provide such a three-dimensional antenna system in order to achieve the same technical effect of improving the response in all directions. Consequently, the board judges that this additional feature does not contribute to inventive step.

3.3 Hence, the board concludes that the subject-matter of claim 1 does not involve an inventive step either.

4. *Conclusion*

As there is no allowable request, it follows that the appeal is to be dismissed.

**Order**

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

The appeal is dismissed.

The Registrar:

The Chairman:



K. Götz-Wein

F. van der Voort

Decision electronically authenticated