



Munich Local
Chamber
UPC_CFI_52/202
3

Decision

of the Court of First Instance of the Unified Patent Court Local
Chamber Munich
issued on 30 August 2024

PLAINTIFF

Avago Technologies International Sales Pte. Limited, 1 Yishun Avenue 7 - 768923 -
Singapore - SG

represented by: Dr Bernd Allekotte (Grünecker).

DEFENDANT

- 1) **Tesla Germany GmbH**, Ludwig-Prandtl-Straße 27-29 - 12526 Berlin – DE
- 2) **Tesla Manufacturing Brandenburg SE**, Tesla Str. 1 - 15537 Grünheide (Mark) - DE

represented by: Dr Marcus Grosch (Quinn Emanuel Urquart & Sullivan).

PATENT IN SUIT

European Patent No. 1 838 002

JUDICIAL PANEL/CHAMBER

Panel 1 of the Munich Local Chamber

PARTICIPATING JUDGES

This decision was issued by Presiding Judge Dr Matthias Zigann, legally qualified Judge Dr Tatyana Zhilova, legally qualified Judge Tobias Pichlmaier, and technically qualified Judge Klaus Loibner.

LANGUAGE OF THE PROCEEDINGS

German

ORAL HEARING

25 June 2024

DATE OF ANNOUNCEMENT

30 August 2024

FACTS

The plaintiff is the registered owner of European patent 1 838 002 B1 (German file number: DE: 60 2006 032 743.9) entitled "Programmable hybrid transmitter". The patent in suit claims priority from US patent application No. 388822 dated 24 March 2006 and US patent application No. 494682 dated 26 July 2006 and was filed as European patent application No. 06025148. The patent application was published on 26 September 2007 under publication number EP 1 838 002 A2. The notice of the grant of the patent in suit by the European Patent Office was published in the European Patent Bulletin on 31 October 2012 (Annexes K1-K3). The patent in suit is now only in force in the Federal Republic of Germany.

Claims 1, 5, 6, 7, 11 and 12 read as follows in the language of grant:

1. A programmable hybrid transmitter comprises:

a baseband processing module (76, 100) coupled to convert outbound data (94) into a complex signal (138) when the programmable hybrid transmitter is in a first mode (134) and to convert the outbound data (94) into at least one of: a normalised complex signal (140), offset information (142), and transmit property information (144) when the programmable hybrid transmitter is in a second mode (136);

an up-conversion module (130) coupled to mix the complex signal (138) with a local oscillation to produce an up-converted signal (146) when the programmable hybrid transmitter is in the first mode (134) and to mix the normalised complex signal (140) with the local oscillation based on the offset information (142) to produce a normalised up-converted signal (148) when the programmable hybrid transmitter is in the second mode (136); and

a power amplifier circuit (132) coupled to amplify the up-converted signal (146) to produce an outbound RF signal when the programmable hybrid transmitter is in the first mode (134) and to amplify the normalised up-converted signal (148) based on the transmit property information (144) to produce the outbound RF signal when the programmable hybrid transmitter is in the second mode (136).

5. The programmable hybrid transmitter of claim 1, wherein the baseband processing module (76, 100) further functions to:

monitor an operational parameter of the programmable hybrid transmitter;

when the operational parameter compares favourably with an operational threshold, place the programmable hybrid transmitter in the first mode (134); and

when the operational parameter compares unfavourably with the operational threshold, place the programmable hybrid transmitter in the second mode (136).

6. The programmable hybrid transmitter of claim 5, wherein the operational parameter includes at least one of:

power level;

peak to average power;

power amplifier 1 dB compression point;

user controllable input; and

wireless protocol modulation specification.

7. A method for use in a programmable hybrid transmitter comprising a baseband processing module (76, 100), an up-conversion module (130) and a power amplifier circuit (132), the method comprising:

converting, by the baseband processing module (76, 100), outbound data (94) into a complex signal (138) when the programmable hybrid transmitter is in a first mode (134);

converting, by the baseband processing module (76, 100), the outbound data (94) into at least one of: a normalised complex signal (140), offset information (142), and transmit property information (144) when the programmable hybrid transmitter is in a second mode (136);

mixing, by the up-conversion module (130), the complex signal (138) with a local oscillation to produce an up-converted signal (146) when the programmable hybrid transmitter is in the first mode (134);

mixing, by the up-conversion module (130), the normalised complex signal (140) with the local oscillation based on the offset information (142) to produce a normalised up-converted signal (148) when the programmable hybrid transmitter is in the second mode (136);

amplifying, by the power amplifier circuit (132), the up-converted signal (146) to produce an outbound RF signal when the programmable hybrid transmitter is in the first mode (134); and

amplifying, by the power amplifier circuit (132), the normalised up-converted signal (148) based on the transmit property information (144) to produce the outbound RF signal when the programmable hybrid transmitter is in the second mode (136).

11. The method of claim 7, further comprising:

monitoring, by the baseband processing module (76, 100), an operational parameter of the programmable hybrid transmitter;

placing, by the baseband processing module (76, 100), the programmable hybrid transmitter in the first mode (134) when the operational parameter compares favourably with an operational threshold; and

placing, by the baseband processing module (76, 100), the programmable hybrid transmitter in the second mode (136) when the operational parameter compares unfavourably with the operational threshold.

12. The method of claim 11, wherein the operational parameter includes at least one of:

power level;

peak to average power;
power amplifier 1 dB compression point;
user controllable input; and
wireless protocol modulation specification.

Claims 1, 5, 6, 7, 11 and 12 read as follows in German translation:

1. Programmable hybrid transmitter with:

a baseband processing module (76, 100) coupled to convert outgoing data (94) into a complex signal (138) when the programmable hybrid transmitter is in a first mode (134), and to convert the outgoing data (94) into at least one of: a normalised complex signal (140), offset information (142) and transmission characteristic information (144) when the programmable hybrid transmitter is in a second mode (136);

an up-conversion module (130) coupled to mix the complex signal (138) with a local oscillation to produce an up-converted signal (146) when the programmable hybrid transmitter is in the first mode (134), and to mix the normalised complex signal (140) with the local oscillation based on the offset information (142) to generate a normalised upconverted signal (148) when the programmable hybrid transmitter is in the second mode (136); and

a current amplifier circuit (132) coupled to amplify the upconverted signal (146) to produce an outgoing RF signal when the programmable hybrid transmitter is in the first mode (134), and to amplify the normalised upconverted signal (148) based on the transmission characteristic information (144) to amplify the normalised upconverted signal (148) to generate the outgoing RF signal when the programmable hybrid transmitter is in the second mode (136).

5. Programmable Hybrid transmitter according to claim 1, where the baseband processing module (76, 100) further operates to:

monitoring an operating parameter of the programmable hybrid transmitter;

if the operating parameter performs well in comparison with an operating threshold, sets the programmable hybrid transmitter to the first mode (134); and

if the operating parameter performs poorly in comparison with the operating threshold, sets the programmable hybrid transmitter to the second mode (136).

6. Programmable hybrid transmitter according to claim 5, wherein the operating parameter comprises at least one of:

power level;

peak power to average power; power amplifier 1 dB compression point; user-controllable input; and wireless protocol modulation specification.

7. A method for use with a programmable hybrid transmitter comprising a baseband processing module (76, 100), an upconvert module (130), and a power amplifier circuit (132), the method comprising:

Converting, by the baseband processing module (76, 100), outgoing data (94) into a complex signal when the programmable hybrid transmitter is in a first mode;

converting, by the baseband processing module (76, 100), the outgoing data (94) into at least one of: a normalised complex signal (140), offset information (142) and transmission characteristic information (144) when the programmable hybrid transmitter is in a second mode (136);

mixing, by the upconverting module (130), the complex signal (138) with a local oscillation to produce an upconverted signal (146) when the programmable hybrid transmitter is in the first mode (134);

mixing, by the upconverting module (130), the normalised complex signal (140) with the local oscillation based on the offset information (142) to generate a normalised upconverted signal (148) when the programmable hybrid transmitter is in the second mode (136);

amplifying, by the current amplifier circuit (132), the up-converted signal (146) to generate an outgoing RF signal when the programmable hybrid transmitter is in the first mode (134); and

Amplify, through the power amplifier circuit (132), the normalised up-converted signal (148) based on the transmission characteristic information (144) to generate the outgoing RF signal when the programmable hybrid transmitter is in the second mode (136).

11. Method according to claim 7, further comprising:

monitoring, by the baseband processing module (76, 100), an operating parameter of the programmable hybrid transmitter;

setting, by the baseband processing module (76, 100), the programmable hybrid transmitter to the first mode (134) when the operating parameter performs well in comparison with an operating threshold; and

setting, by the baseband processing module (76, 100), the programmable hybrid transmitter to the second mode (136) when the operating parameter performs poorly in comparison with the operating threshold value.

12. The method according to claim 11, wherein the operating parameter comprises at least one of:

power level;

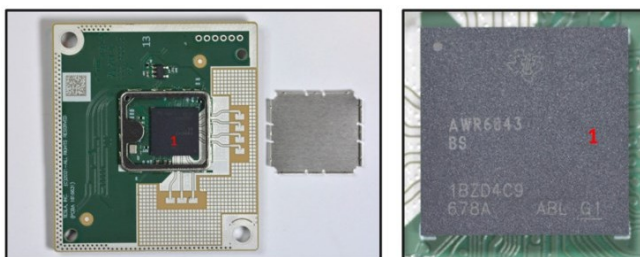
peak power to average power; power amplifier 1 dB compression point; user-controllable input; and wireless protocol modulation specification.

The defendants sell vehicles in Germany that contain interior radar, for example the "Tesla 2022 Model Y Performance" vehicle. The radar installed in the defendants' vehicles is offered and marketed by the defendants in the Federal Republic of Germany without the plaintiff's consent. The mention of the "Tesla 2022 Model Y Performance" is to be understood as an example and is not limited to this model. Any of the defendants' vehicles equipped with an interior radar that makes use of the technical teaching of the patent in suit are affected.

The Tesla Model Y and its interior radar are shown below:

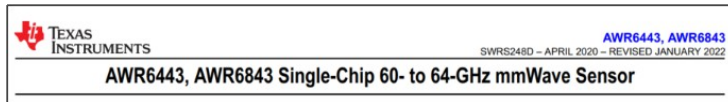


The following shows the removed circuit board of the radar from the Tesla Model Y purchased by the plaintiff:



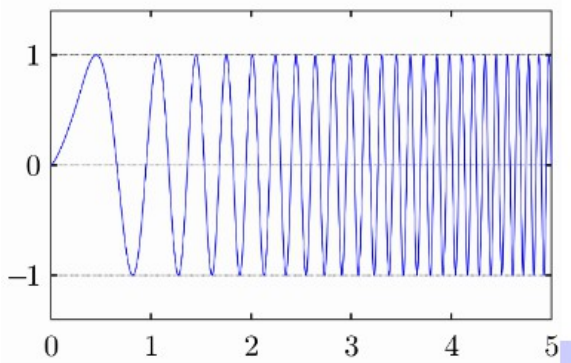
In the centre, on the front of the circuit board, there is a chip manufactured by Texas Instruments. The label indicates that it is an AWR6843 chip. The manufacturer provides data sheets and additional information on its website at <https://www.ti.com/product/AWR6843>. Excerpts from the website with a list of the documents available there for the AWR6843 chip are provided in Appendix K7. The data sheet for AWR6843 (available at <https://www.ti.com/product/AWR6843#tech-docs>) is provided in Appendix K8.

This is a "single-chip mmWave sensor" that operates in the 60 to 64 GHz range, as shown on page 1 of the data sheet in Annex K8:



The AWR6843 chip is a radar transmitter and receiver that can be operated in (at least) two modes, namely a normal mode and a calibration mode. Calibration detects deviations from desired normal operation and thus enables the adjustment of various parameters in order to achieve a desired emitted signal, for example. The calibration mode is therefore used to fine-tune the radar transmitter in order to detect and correct errors, thereby improving the accuracy and reliability of the system. The two modes – normal mode and calibration mode – are programmable, e.g. with regard to the sequence of modes, emitted signal, etc. According to the data sheet in Appendix K8, the AWR6843 chip is intended for fast chirp systems. In signal processing, a chirp is a signal whose frequency, i.e. the number of oscillations per unit of time, changes over time.

The following figure (from <https://de.wikipedia.org/wiki/Chirp>) shows the time course of a chirp in blue. Here, the time course of a sinusoidal signal is shown with time on the horizontal axis and the amplitude of the signal, which oscillates around a zero position, on the vertical axis:

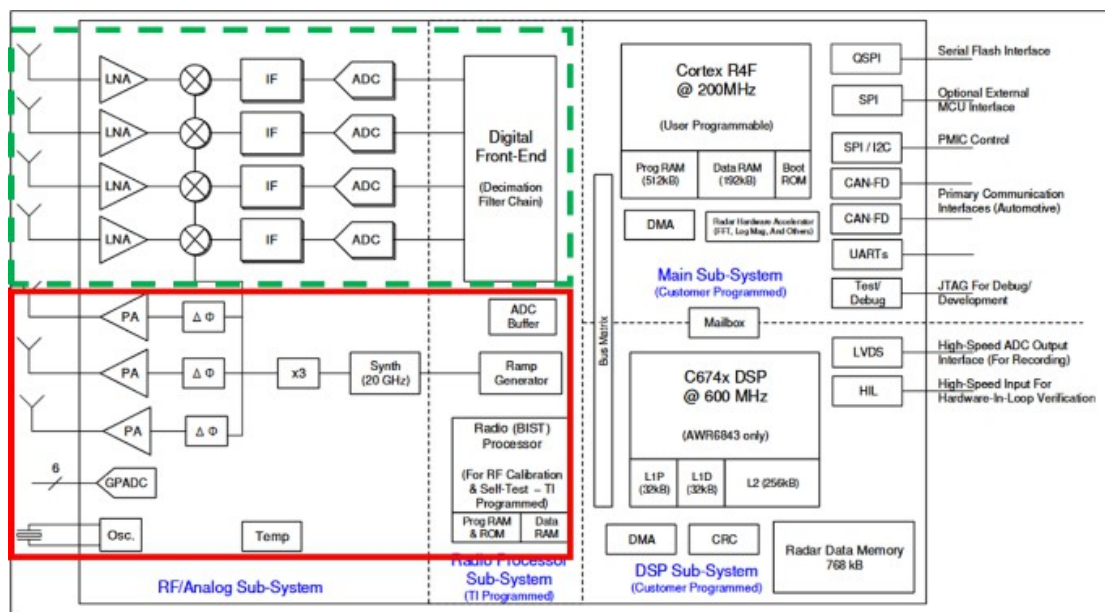


In the special case of a linear chirp, the frequency increases linearly with time. Linear chirps are illustrated in the following figure (adapted from <https://www.ti.com/lit/an/swra553a/swra553a.pdf>, which is available in the technical documentation section of the AWR6843 website, <https://www.ti.com/product/AWR6843#tech-docs>, and is also available as Appendix K10). The horizontal axis indicates the time progression and the vertical axis indicates the frequency:



The AWR6843 radar chip transmits such chirps and receives them after they have been reflected from objects in the environment. This allows information about these objects in the vicinity of the radar chip to be obtained. For example, the direction and/or distance to the object, or even the relative speed between the transmitter and the object, can be determined. By using chirps with varying frequencies, the radar system can therefore obtain information in various applications. In other words, the transmitter of the radar chip communicates with the receiver of the radar chip so that the receiver obtains information about the environment.

Appendix K8 contains a block diagram of the AWR6843 chip used in the contested embodiment (see p. 3). Coloured markings have been added to the following illustration. The chip contains a transmitter (part), which is marked in red in the block diagram shown below, and a receiver (part), which is marked in green dotted lines:



The transmitter can be operated in two modes, namely normal mode and calibration mode. Normal mode corresponds to the usual functionality of the radar for detecting objects. In this mode, the chirps are transmitted according to the selected profile and received after reflection.

The plaintiff is of the opinion that, by manufacturing and distributing vehicles with the interior radar described above, the defendants are directly or indirectly making use of the technical teaching of claims 1, 5, 6, 7, 11 and 12 in the literal sense.

The defendants dispute the plaintiff's standing to sue and any infringement of the patent in suit. They argue that the interior radar does not make use of the features. They further argue that the plaintiff has already misrepresented the functionality of the contested chip. The contested chip is part of an interior radar ("*in cabin radar*"). A radar detects via the

Sending and receiving signals (electromagnetic waves) objects by comparing a transmitted signal with the corresponding reflected signal on the receiving end in order to derive information about objects from the reflection. The essential signal processing therefore takes place in the receiver. The underlying radar technology is therefore not concerned with the transmission of data from one communication device to another. There is no baseband signal (useful signal) that would be modulated onto a high-frequency carrier by "up-conversion". In particular, the contested chip lacks a baseband processing module for converting outgoing data into a complex signal (feature group 1.1) and for mixing a complex signal with a signal from a local oscillator (feature group 1.2). Against this background, the realisation of feature group 1.3 is also ruled out from the outset. The plaintiff's submission with regard to the retroactive claims 5 and 6 is hardly comprehensible and in any case inconclusive. Therefore, the patent in suit is not directly infringed either within the scope of independent claim 1 or within the scope of the further asserted claims 5 and 6. Similarly, process claims 7, 11 and 12 are neither directly nor indirectly infringed.

Furthermore, the defendants are challenging the patent in suit with counterclaims for revocation. In these, the defendants refer to the following documents and citations:

Appendix WK1 – Patent specification EP 1 838

002 B1 Appendix WK2 – Original application

Appendix WK3 – Priority document US

388822 Appendix WK4 – Priority

document US 494682 Appendix WK5 –

Feature breakdown

Appendix WK6 – Extract from the European Patent Register for WO

2007/010091 A1 Citation D1 – US 2005/0135502 A1

Citation D2 – WO 02/065649 A2 Citation D3 –

WO 2007/010091 A1 Citation D4 – US

2006/0038710 A1 Citation D5 – US 6,906,996

B2

Citation D6 – "Microwave and RF Design of wireless systems"

Citation D7 – "Polar Modulation"

Citation D8 – "Digital Modulation in Communications Systems — An Introduction" Citation D9 – "A 1.75-

GHz Polar Modulated CMOS RF Power Amplifier for GSM-EDGE" Citation D10 – "Complex signal

processing is not – complex"

Citation D11 – US 2005/0191976 A1

The plaintiff has contested the defendant's representation. It defends the patent in suit with auxiliary requests.

The defendants argue that the plaintiff's response to the counterclaims for annulment does not contain an admissible request for amendment of the patent. They also argue that the request for amendment of the patent filed on 8 April 2024 was filed after the deadline and is therefore inadmissible. In the defendants' view, it should not be admitted at a later date, even with the court's permission.

For further details, reference is made to the written pleadings and other documents submitted.

APPLICATIONS OF THE PARTIES

Regarding the action:

The plaintiff requests

I. The defendants be ordered to refrain from

1.1 a programmable hybrid transmitter with a baseband processing module coupled to convert outgoing data into a complex signal when the programmable hybrid transmitter is in a first mode, and to convert the outgoing data into at least one of: a normalised complex signal, offset information and transmission characteristic information when the programmable hybrid transmitter is in a second mode, an upconversion module coupled to mix the complex signal with a local oscillation to produce an upconverted signal when the programmable hybrid transmitter is in the first mode, and to mix the normalised complex signal with the local oscillation based on the offset information to produce a normalised upconverted signal when the programmable hybrid transmitter is in the second mode, and a power amplifier circuit coupled to amplify the upconverted signal to produce an outgoing RF signal when the programmable hybrid transmitter is in the first mode, and to amplify the normalised upconverted signal based on the transmission characteristic information to produce the outgoing RF signal when the programmable hybrid transmitter is in the second mode,

to manufacture, offer, market, use or import or possess in the Federal Republic of Germany for the aforementioned purposes, in particular if these are installed in the defendant's vehicles.

(Claim 1 of EP 1 838 002, direct infringement) in particular, if

1.2 in the programmable hybrid transmitter according to section I.1.1, the baseband processing module further operates in such a way that it:

monitors an operating parameter of the programmable hybrid transmitter;

if the operating parameter performs well in comparison with an operating threshold value, sets the programmable hybrid transmitter to the first mode; and

if the operating parameter performs poorly in comparison with the operating threshold value, the programmable hybrid transmitter is set to the second mode;

(direct infringement of claim 5 of EP 1 838 002)

and in particular, if

1.3 in the programmable hybrid transmitter according to section I.1.2, the operating parameter has at least one of:

- power level;*
- peak power to average power;*
- power amplifier 1 dB compression point;*
- user-controllable input; and*
- wireless protocol modulation specification;*

(direct infringement of claim 6 of EP 1 838 002); and/or

2.1 a method for use in a programmable hybrid transmitter comprising a baseband processing module, an upconversion module and a power amplifier circuit, to be used in the Federal Republic of Germany, the method comprising:

converting, by the baseband processing module, outgoing data into a complex signal when the programmable hybrid transmitter is in a first mode; converting, by the baseband processing module, the outgoing data into at least one of: a normalised complex signal, offset information and transmission characteristic information, when the programmable hybrid transmitter is in a second mode; mixing, by the upconverting module, the complex signal with a local oscillation to produce an upconverted signal when the programmable hybrid transmitter is in the first mode; mixing, by the upconvert module, the normalised complex signal with the local oscillation based on the offset information to produce a normalised upconverted signal when the programmable hybrid transmitter is in the second mode; amplifying, by the power amplifier circuit, the up-converted signal to produce an outgoing RF signal when the programmable hybrid transmitter is in the first mode; and amplifying, by the power amplifier circuit, the normalised up-converted signal based on the transmission characteristic information to generate the outgoing RF signal when the programmable hybrid transmitter is in the second mode,

in particular, if this is used in the defendant's vehicles (claim 7 of EP 1 838 002, direct infringement),

in particular if

2.2 the method according to section 1.2.1. further comprises:

monitoring, by the baseband processing module, an operating parameter of the programmable hybrid transmitter;

setting, by the baseband processing module, the programmable hybrid transmitter to the first mode if the operating parameter performs well in comparison with an operating threshold value; and

setting the programmable hybrid transmitter to the second mode by the baseband processing module when the operating parameter performs poorly in comparison with the operating threshold value;

(direct infringement of claim 11 of EP 1 838 002); and in

particular, if

2.3 in the method according to section 1.2.2, the operating parameter has at least one of:

- power level;*
- peak power to average power;*
- power amplifier 1 dB compression point;*
- user-controllable input; and*
- wireless protocol modulation specification;*

(direct infringement of claim 12 of EP 1 838 002); and/or

3.1 offering or supplying devices to third parties for use in the Federal Republic of Germany, which are suitable for

a method for use with a programmable hybrid transmitter comprising a baseband processing module, an upconversion module and a power amplifier circuit, the method comprising:

Converting, by the baseband processing module, outgoing data into a complex signal when the programmable hybrid transmitter is in a first mode; converting, by the baseband processing module, the outgoing data into at least one of: a normalised complex signal, offset information and transmission characteristic information, when the programmable hybrid transmitter is in a second mode; mixing, by the upconverting module, the complex signal with a local oscillation to produce an upconverted signal when the programmable hybrid transmitter is in the first mode; mixing, by the upconvert module, the normalised complex signal with the local oscillation based on the offset information to produce a normalised upconverted signal when the programmable hybrid transmitter is in the second mode; amplifying, by the power amplifier circuit, the upconverted signal to generate an outgoing RF signal when the programmable hybrid transmitter is in the first mode; and amplifying, by the power amplifier circuit, the normalised upconverted signal based on the transmission characteristic information to produce the outgoing RF signal when the programmable hybrid transmitter is in the second mode,

to be performed,

in particular, if these are installed in the defendant's vehicles (claim 7 of EP 1 838 002, indirect infringement),

in particular if,

3.2 the method according to section I.3.1. further comprises:

monitoring, by the baseband processing module, an operating parameter of the programmable hybrid transmitter;

setting, by the baseband processing module, the programmable hybrid transmitter to the first mode when the operating parameter performs well in comparison with an

operating threshold value; and setting, by the baseband processing module, the programmable hybrid transmitter to the second mode when the operating parameter performs poorly in comparison with the operating threshold value;

(indirect infringement of claim 11 of EP 1 838 002); and in

particular, if

3.3 in the method according to section I.3.2, the operating parameter has at least one of:

- power level;*
- peak power to average power;*
- power amplifier 1 dB compression point;*
- user-controllable input; and*
- wireless protocol modulation specification;*

(indirect infringement of claim 12 of EP 1 838 002).

Alternatively to 1.1 to 3.3:

4.1 a programmable hybrid transmitter with a baseband processing module coupled to convert outgoing data into a complex signal when the programmable hybrid transmitter is in a first mode, and to convert the outgoing data into: a normalised complex signal, offset information and transmission characteristic information when the programmable hybrid transmitter is in a second mode, an up-conversion module coupled to mix the complex signal with a local oscillation to produce an up-converted signal when the programmable hybrid transmitter is in the first mode, and to mix the normalised complex signal with the local oscillation based on the offset information to produce a normalised up-converted signal when the programmable hybrid transmitter is in the second mode, and a power amplifier circuit coupled to amplify the upconverted signal to produce an outgoing RF signal when the programmable hybrid transmitter is in the first mode, and to amplify the normalised upconverted signal based on the transmission characteristic information to produce the outgoing RF signal when the programmable hybrid transmitter is in the second mode,

to manufacture, offer, market, use or import or possess in the Federal Republic of Germany for the aforementioned purposes, in particular if these are installed in the defendant's vehicles.

(Claim 1 of EP 1 838 002 according to the auxiliary request, direct infringement)

in particular if

4.2 in the programmable hybrid transmitter according to section I.4.1, the baseband processing module further operates in such a way that it:

monitors an operating parameter of the programmable hybrid transmitter;

if the operating parameter performs well in comparison with an operating threshold value, sets the programmable hybrid transmitter to the first mode; and

if the operating parameter performs poorly in comparison with the operating threshold value, the programmable hybrid transmitter is set to the second mode;

(direct infringement of claim 5 of EP 1 838 002 according to the auxiliary request)

and, in particular, if

4.3 in the programmable hybrid transmitter according to section I.4.2, the operating parameter has at least one of:

- power level;*
- peak power to average power;*
- Power amplifier 1 dB compression point;*
- user-controllable input; and*
- wireless protocol modulation specification;*

(direct infringement of claim 6 of EP 1 838 002 according to the auxiliary request);

and/or

5.1 a method for use in a programmable hybrid transmitter comprising a baseband processing module, an upconversion module and a power amplifier circuit,

to be used in the Federal Republic of Germany,

the method comprising:

converting, by the baseband processing module, outgoing data into a complex signal when the programmable hybrid transmitter is in a first mode; converting, by the baseband processing module, the outgoing data into: a normalised complex signal, offset information and transmission characteristic information when the programmable hybrid transmitter is in a second mode; mixing, by the upconverting module, the complex signal with a local oscillation to produce an upconverted signal when the programmable hybrid transmitter is in the first mode; mixing, by the upconverting module, the normalised complex signal with the local oscillation based on the offset information to produce a normalised upconverted signal when the programmable hybrid transmitter is in the second mode; amplifying, by the power amplifier circuit, the upconverted signal to produce an outgoing RF signal when the programmable hybrid transmitter is in the first mode; and amplifying, by the power amplifier circuit, the normalised upconverted signal based on the transmission characteristic information to produce the outgoing RF signal when the programmable hybrid transmitter is in the second mode.

in particular, insofar as this is used in the defendant's vehicles (claim 7 of EP 1

838 002 according to the auxiliary request, direct infringement), in particular if

5.2 the method according to section I.5.1. further comprises:

monitoring, by the baseband processing module, an operating parameter of the programmable hybrid transmitter;

setting, by the baseband processing module, the programmable hybrid transmitter to the first mode if the operating parameter performs well in comparison with an operating threshold value; and

setting the programmable hybrid transmitter to the second mode by the baseband processing module if the operating parameter performs poorly in comparison with the operating threshold value;

(direct infringement of claim 11 of EP 1 838 002 according to the auxiliary

request); and in particular, if

5.3 in the method according to section I.5.2, the operating parameter has at least one of:

- power level;*
- peak power to average power;*
- power amplifier 1 dB compression point;*
- user-controllable input; and*
- wireless protocol modulation specification;*

(direct infringement of claim 12 of EP 1 838 002 according to the auxiliary

request); and/or

6.1 Offering or supplying devices to third parties for use within the Federal Republic of Germany

which are suitable for

a method for use with a programmable hybrid transmitter comprising a baseband processing module, an upconversion module and a power amplifier circuit, the method comprising:

converting, by the baseband processing module, outgoing data into a complex signal when the programmable hybrid transmitter is in a first mode; converting, by the baseband processing module, the outgoing data into: a normalised complex signal, offset information and transmission characteristic information when the programmable hybrid transmitter is in a second mode; mixing, by the upconverting module, the complex signal with a local oscillation to produce an upconverted signal when the programmable hybrid transmitter is in the first mode; mixing, by the upconverting module, the normalised complex signal with the local oscillation based on the offset information to produce a normalised upconverted signal when the programmable hybrid transmitter is in the second mode; amplifying, by the power amplifier circuit, the up-converted signal to produce an outgoing RF signal when the programmable hybrid transmitter is in the first mode; and amplifying, by the power amplifier circuit, the normalised upconverted signal based on the transmission characteristic information to produce the outgoing RF signal when the programmable hybrid transmitter is in the second mode,

to perform,

in particular, if these are installed in the defendant's vehicles (claim 7 of EP 1

838 002 according to the auxiliary request, indirect infringement), in particular if

6.2 the method according to section I.6.1. further comprises:

monitoring, by the baseband processing module, an operating parameter of the programmable hybrid transmitter;

setting, by the baseband processing module, the programmable hybrid transmitter to the first mode if the operating parameter performs well in comparison with an operating threshold value; and

setting the programmable hybrid transmitter to the second mode by the baseband processing module when the operating parameter performs poorly in comparison with the operating threshold value.

(indirect infringement of claim 11 of EP 1 838 002 according to the auxiliary request); and in particular, if

6.3 in the method according to section I.6.2, the operating parameter has at least one of:

- power level;*
- peak power to average power;*
- power amplifier 1 dB compression point;*
- user-controllable input; and*
- wireless protocol modulation specification.*

(Indirect infringement of claim 12 of EP 1 838 002 according to the auxiliary request).

II. It is hereby determined that the current Tesla Model Y Performance model infringes EP 1 838 002 due to the features contained therein pursuant to Section I.

III. The defendants are ordered, at their own expense,

- 1. recall the products referred to in Section I from the distribution channels;*
- 2. to permanently remove the products referred to in Section I from the distribution channels; and*
- 3. to destroy the products referred to in Section I in their possession.*

IV. The defendants are ordered to provide the plaintiff with the following information:

- the origin and distribution channels of the products referred to in Section I,*
- the quantities produced, manufactured, delivered, received or ordered and the prices paid for the products referred to in point I, and*
- the identity of all third parties involved in the production or distribution of products in accordance with Section I.*

V. The plaintiff is permitted to announce and publish the decision in whole or in part in public media, whereby the defendants shall reimburse the costs of a full-page publication (print) in five national daily newspapers and five trade media, each at the plaintiff's discretion.

VI. In the event of any violation of

- 1. the decision pursuant to Section I and*
- 2. the orders pursuant to Sections III and IV*

the defendants shall pay a repeated penalty to the court, the amount of which shall be determined by the court.

VII. It is hereby determined that the defendants shall compensate the plaintiff for any damage incurred and still to be incurred as a result of actions pursuant to Section I since 29 October 2018, whereby the amount of the damage shall be determined in subsequent proceedings.

VIII. The defendants are also ordered to pay EUR 50,000.00 as lump-sum damages on a provisional basis.

The defendants request that

- 1. The action is dismissed.*
- 2. The costs of the legal dispute shall be borne by the plaintiff.*

In the alternative, it is requested that:

- 1. The enforcement of the decision is dependent on the provision of security by the plaintiff, whereby the security may be provided in the form of a bank guarantee.*
- 2. It is ordered that the information be disclosed only to an auditor to be named by the plaintiff, who is also bound to secrecy vis-à-vis the plaintiff.*
- 3. It is ordered that the data and information to be disclosed in the context of the provision of information is confidential information that must be treated as strictly confidential and may not be used or disclosed outside the present legal dispute, even after its conclusion. The plaintiff may only make the designated information available to those representatives and, internally, to those employees who have a legitimate interest in it. Internal access is to be limited to a maximum of three reliable persons, whose names are to be disclosed to the court and the defendants. Any further access to the designated information is to be declared inadmissible.*

The defendants communicated the amount of the required security deposit in their written statement of 24 May 2024 (App_30368/2024). Parts of the content are confidential.

Regarding the counterclaim:

The defendants request that

1. *European patent EP 1 838 002 be declared invalid in its entirety.*
2. *The costs of the legal dispute shall be borne by the plaintiff.*

The claimant requests:

1. *The counterclaim for annulment is dismissed.*
2. *In the alternative: The patent in suit be amended in accordance with Rule 30 of the Rules of Procedure on the basis of the attached set of claims [Annexes K24-27] and upheld.*
3. *The defendants bear the costs of the legal dispute.*

REASONS

The admissible counterclaims are well founded. The patent in suit is to be declared invalid on the basis of the counterclaims. The admissible action is to be dismissed.

A. Admissibility

The action and counterclaims are admissible.

The counterclaims were directed against the registered patent proprietor in accordance with Rules 25, 42, 8.6 VerfO, so that the substantive entitlement to the patent in suit can be left open in the context of the counterclaim.

Since the infringement action must be dismissed due to the invalidity of the patent in suit, the question of standing to sue in the infringement action can also be left open.

B. Patent in suit

I. In its order in Case 10x and Harvard/Nanostring (UPC_CoA_335/2023 App_576355/2023, GRUR 2024, 527), the EPG Court of Appeal adopted the following standard for the interpretation of patent claims:

The EPG Court of Appeal proceeds from the following principles in accordance with Article 69 of the Convention on the Grant of European Patents (EPÜ) and the Protocol on its interpretation.

The patent claim is not only the starting point but also the decisive basis for determining the scope of protection of the European patent.

The interpretation of a patent claim does not depend solely on its precise wording in the linguistic sense. Rather, the description and drawings must always be taken into account as aids to the interpretation of the patent claim

and not only to be used to resolve any ambiguities in the patent claim.

However, this does not mean that the patent claim serves merely as a guideline and that its subject matter also extends to what, after examination of the description and drawings, appears to be the patent proprietor's claim for protection.

The patent claim must be interpreted from the perspective of a person skilled in the art.

When applying these principles, adequate protection for the patent proprietor should be combined with sufficient legal certainty for third parties.

These principles for interpreting a patent claim apply equally to the assessment of infringement and the legal validity of a European patent. This follows from the function of patent claims, which, according to the European Patent Convention, serve to define the scope of protection of the patent under Article 69 EPC and thus the rights of the patent proprietor in the designated Contracting States under Article 64 EPC, taking into account the requirements for patentability under Articles 52 to 57 EPC.

II. Applying the principles for interpreting claims set out in section I, the Local Chamber interprets the patent in suit as follows:

1. The invention claimed by the patent in suit lies in the field of communication systems and relates in particular to *radio frequency* transmitters used in such communication systems (para. [0002]).

2. As correctly stated by the defendants in their counterclaims for revocation and not disputed by the plaintiff, the relevant skilled person is an electrical engineer with a university degree and several years of experience in the field of high-frequency circuits, who has spent several years working in particular on the design of transceivers and modulation techniques for data transmission.

3. According to the description of the patent in suit, communication systems are known to support wireless or wired communication between communication devices. Such communication systems range from mobile phone systems to the Internet to wireless point-to-point networks in households, with each communication system operating according to one or more communication standards, such as IEEE 802.11, Bluetooth, GSM, CDMA, RFID (para. [0003]). Depending on the type of wireless communication system, wireless communication devices, e.g. mobile phones, communicate with other wireless communication devices via at least one channel, either directly ("*point-to-point communication*") or indirectly. In indirect wireless communication, each wireless communication device communicates directly with an associated base station (e.g. mobile phone services) and/or an associated access point (e.g. for a wireless network in a house or building) via an assigned channel (para. [0004]). In order to participate in wireless communication, wireless communication devices either have a built-in *radio* transceiver or are coupled to an associated radio transceiver (e.g. a station for wireless communication networks in the home and/or in buildings) (para. [0005]).

The patent in suit mentions two basic types of radio transmitters in the prior art, namely *Cartesian-based* transmitters (para. [0007] f.) and *polar-based transmitters* (para. [0010] f.).

A Cartesian-based transmitter comprises circuits for baseband processing and high-frequency transmission ("*RF transmission* circuitry"). As part of baseband processing, outgoing data is encoded, punctured, assigned to a signal space ("*maps*", "*constellation mapping*"), interleaved and converted into an in-phase signal component (I) and a quadrature signal component (Q), whereby the I signal component and the Q signal component are generated as analogue signals by means of a digital-to-analogue converter (para. [0007]). The circuit for high-frequency transmission comprises a local oscillator, a mixer and a linear power amplifier, whereby in *direct conversion transmitters*, the local oscillator generates an I local oscillator signal and a Q local oscillator signal, which are mixed with the respective I signal components and Q signal components by means of a mixer. The resulting signals are summed to generate a high-frequency signal, which is amplified by the linear line amplifier. The amplified high-frequency signal can be filtered by means of a bandpass filter before transmission (para. [0008]).

A Cartesian-based transmitter has the advantages of a single-sideband transmitter, i.e. no additional negative frequencies arise in the I and Q signals that would need to be filtered (para. [0009]).

A polar coordinate-based transmitter also comprises circuits for baseband processing and high-frequency transmission. As part of baseband processing, outgoing data is encoded, punctured, assigned to a signal space ("*maps*", "*constellation mapping*"), interleaved and converted into polar coordinates of an amplitude (A) and a phase (Φ). For example, after puncturing, the encoded values could be interleaved to produce a first and a second interleaved value, whereby the first interleaved value would be mapped to an amplitude value of A_0 and a phase value of ϕ_0 and the second interleaved value would be mapped to an amplitude value of A_1 and a phase value of ϕ_1 (para. [0010]). The circuit for high-frequency transmission comprises a local oscillator and a power amplifier. The local oscillator comprises a *phase-locked loop (PLL)* which generates a local oscillation at a desired high frequency modulated on the basis of the phase values ϕ_0 and ϕ_1 . The phase-modulated high-frequency signal is then amplitude-modulated by the power amplifier according to the respective amplitude values A_0 and A_1 to generate a phase- and amplitude-modulated RF signal (para. [0011]).

The polar coordinate-based transmitter offers the advantages of lower requirements for high-frequency filtering due to the response behaviour of the PLL and the use of a non-linear power amplifier, which can deliver higher output power than a linear power amplifier with the same chip area (para. [0012]).

Furthermore, the patent in suit cites US 2005/0191976 as prior art, which describes a high-frequency transmitter that uses two digital-to-high-frequency converters to convert digital baseband signals into high-frequency signals. In Cartesian mode, baseband signals are forwarded to the converter modules for high-frequency conversion, and in polar mode, the baseband signals are converted into amplitude and phase data. The phase data portion would be converted into I and Q data portions, which would be converted into high-frequency signals by the converter modules and modulated in a power amplifier with the amplitude data portion via the power supply of the power amplifier (para. [0014]).

At this state of the art, the patent in suit describes as disadvantageous the fact that, in Cartesian-based transmitters, the transmission path (i.e. mixer and power amplifier) must be linear in order to prevent a loss of *data resolution*. Furthermore, this linearity requirement limits the output power of the power amplifier (para. [0009]). On the other hand, in polar coordinate-based transmitters, it is disadvantageous that

the response behaviour of the PLL, the high-frequency transmitters are limited to narrowband applications. Maintaining synchronisation between the phase values and the amplitude values can be difficult due to delays within the PLL. In addition, real signals are used in baseband processing, so that possible negative frequencies must be taken into account (para. [0012]).

4. According to the description of the patent in suit, the patent in suit is therefore based on the task of providing a programmable hybrid transmitter that combines the advantages of Cartesian-based transmitters and polar coordinate-based transmitters known in the prior art while overcoming the disadvantages associated with the respective transmitters, such as the linearity requirement for mixers and power amplifiers in the transmission path and the applicability for only narrow bandwidths (Abs [0013]).

5. To solve this problem, the patent in suit protects a programmable hybrid transmitter according to the combination of features listed in claim 1, as well as a method for use with a programmable hybrid transmitter with the method steps characterised in claim 7.

Claims 1 and 7 can be represented in the form of a feature structure in the relevant English-language version of the claims and in the German-language translation as follows:

Claim 1:

	EN	DE
1.	A programmable hybrid transmitter comprises:	Programmable hybrid transmitter comprising:
1.1	a baseband processing module (76, 100) coupled	a baseband processing module (76, 100) coupled to
1.1.1	to convert outbound data (94) into a complex signal (138) when the programmable hybrid transmitter is in a first mode (134) and	to convert outbound data (94) into a complex signal (138) when the programmable hybrid transmitter is in a first mode (134), and
1.1.2	to convert the outbound data (94) into at least one of: a normalised complex signal (140), offset information (142), and transmit property information (144) when the programmable hybrid transmitter is in a second mode (136);	converting the outgoing data (94) into at least one of: a normalised complex signal (140), offset information (142) and transmission characteristic information (144) when the programmable hybrid transmitter is in a second mode (136);
1.2	an up-conversion module (130) coupled	an up-conversion module (130) coupled
1.2.1	to mix the complex signal (138) with a local oscillation to produce an up-converted signal (146) when the programmable hybrid transmitter is in the first mode (134) and	to mix the complex signal (138) with a local oscillation to produce an up-converted signal (146) when the programmable hybrid transmitter is in the first mode (134), and

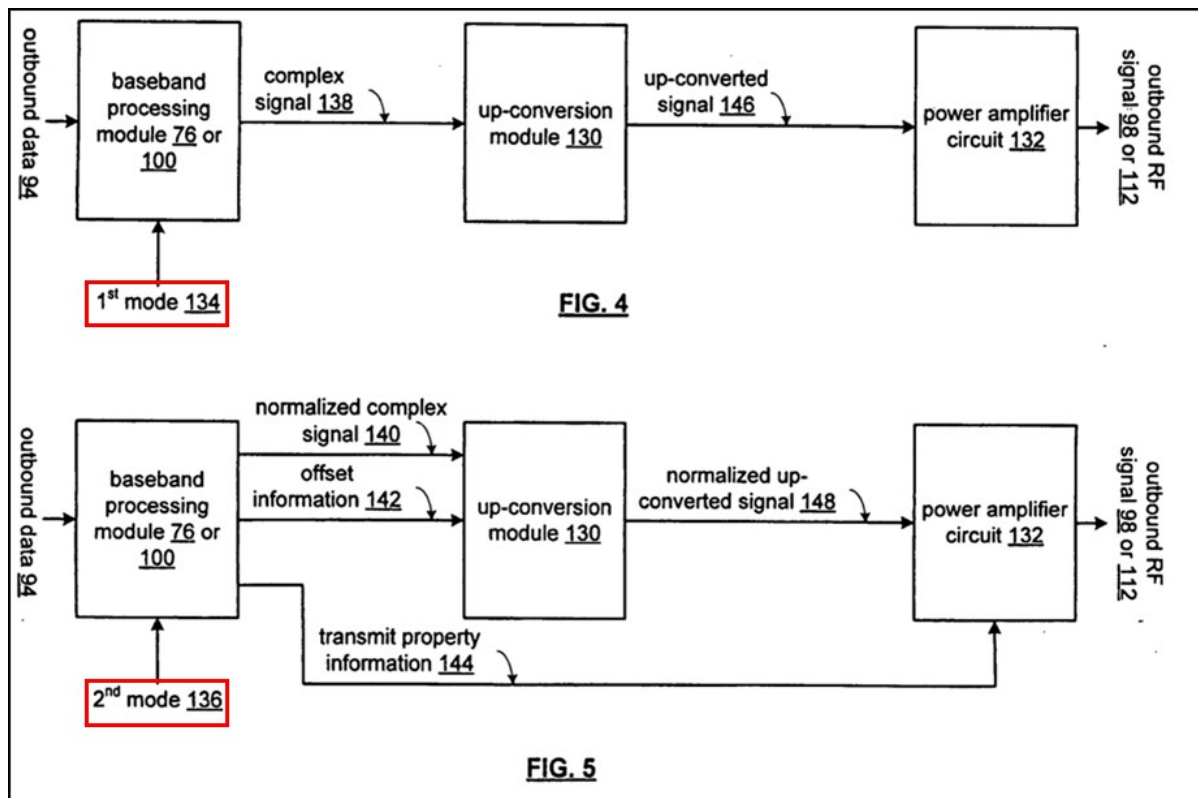
1.2.2	to mix the normalised complex signal (140) with the local oscillation based on the offset information (142) to produce a normalised up-converted signal (148) when the programmable hybrid transmitter is in the second mode (136); and	to mix the normalised complex signal (140) with the local oscillation based on the offset information (142) to produce a normalised up-converted signal (148) when the programmable hybrid transmitter is in the second mode (136); and
1.3	a power amplifier circuit (132) coupled	a power amplifier circuit (132) coupled
1.3.1	to amplify the up-converted signal (146) to produce an outbound RF signal when the programmable hybrid transmitter is in the first mode (134) and	to amplify the up-converted signal (146) to produce an outbound RF signal when the programmable hybrid transmitter is in the first mode (134), and
1.3.2	to amplify the normalised up-converted signal (148) based on the transmit property information (144) to produce the outbound RF signal when the programmable hybrid transmitter is in the second mode (136).	to amplify the normalised up-converted signal (148) based on the transmit property information (144) to produce the outbound RF signal when the programmable hybrid transmitter is in the second mode (136).

Claim 7:

	EN	EN
7	A method for use in a programmable hybrid transmitter comprising a baseband processing module (76, 100), an up-conversion module (130) and a power amplifier circuit (132), the method comprising:	Method for use in a programmable hybrid transmitter comprising a baseband processing module (76, 100), an up-conversion module (130) and a power amplifier circuit (132), the method comprising:
7.1.1	converting, by the baseband processing module (76, 100), outbound data (94) into a complex signal (138) when the programmable hybrid transmitter is in a first mode (134);	converting, by the baseband processing module (76, 100), outbound data (94) into a complex signal, when the programmable hybrid transmitter is in a first mode;
7.1.2	converting, by the baseband processing module (76, 100), the outbound data (94) into at least one of: a normalised complex signal (140), offset information (142), and transmit property information (144) when the programmable hybrid transmitter is in a second mode (136);	Converting, by the baseband processing module (76, 100), the outgoing data (94) into at least one of: a normalised complex signal (140), offset information (142) and transmission characteristic information (144), if the programmable hybrid transmitter is in a second mode (136);

7.2.1	mixing, by the up-conversion module (130), the complex signal (138) with a local oscillation to produce an up-converted signal (146) when the programmable hybrid transmitter is in the first mode (134);	mixing, by the up-conversion module (130), the complex signal (138) with a local oscillation to produce an up-converted signal (146) when the programmable hybrid transmitter is in the first mode (134);
7.2.2	mixing, by the up-conversion module (130), the normalised complex signal (140) with the local oscillation based on the offset information (142) to produce a normalised up-converted signal (148) when the programmable hybrid transmitter is in the second mode (136);	mixing, by the up-conversion module (130), the normalised complex signal (140) with the local oscillation based on the offset information (142) to produce a normalised up-converted signal (148) when the programmable hybrid transmitter is in the second mode (136);
7.3.1	amplifying, by the power amplifier circuit (132), the up-converted signal (146) to produce an outbound RF signal when the programmable hybrid transmitter is in the first mode (134); and	Amplify, through the power amplifier circuit (132), the up-converted signal (146) to generate an outgoing RF signal when the programmable hybrid transmitter is in the first mode (134); and
7.3.2	amplifying, by the power amplifier circuit (132), the normalised up-converted signal (148) based on the transmit property information (144) to produce the outbound RF signal when the programmable hybrid transmitter is in the second mode (136).	Amplifying, by the power amplifier circuit (132), the normalised up-converted signal (148) based on the transmit property information (144) to produce the outbound RF signal when the programmable hybrid transmitter is in the second mode (136).

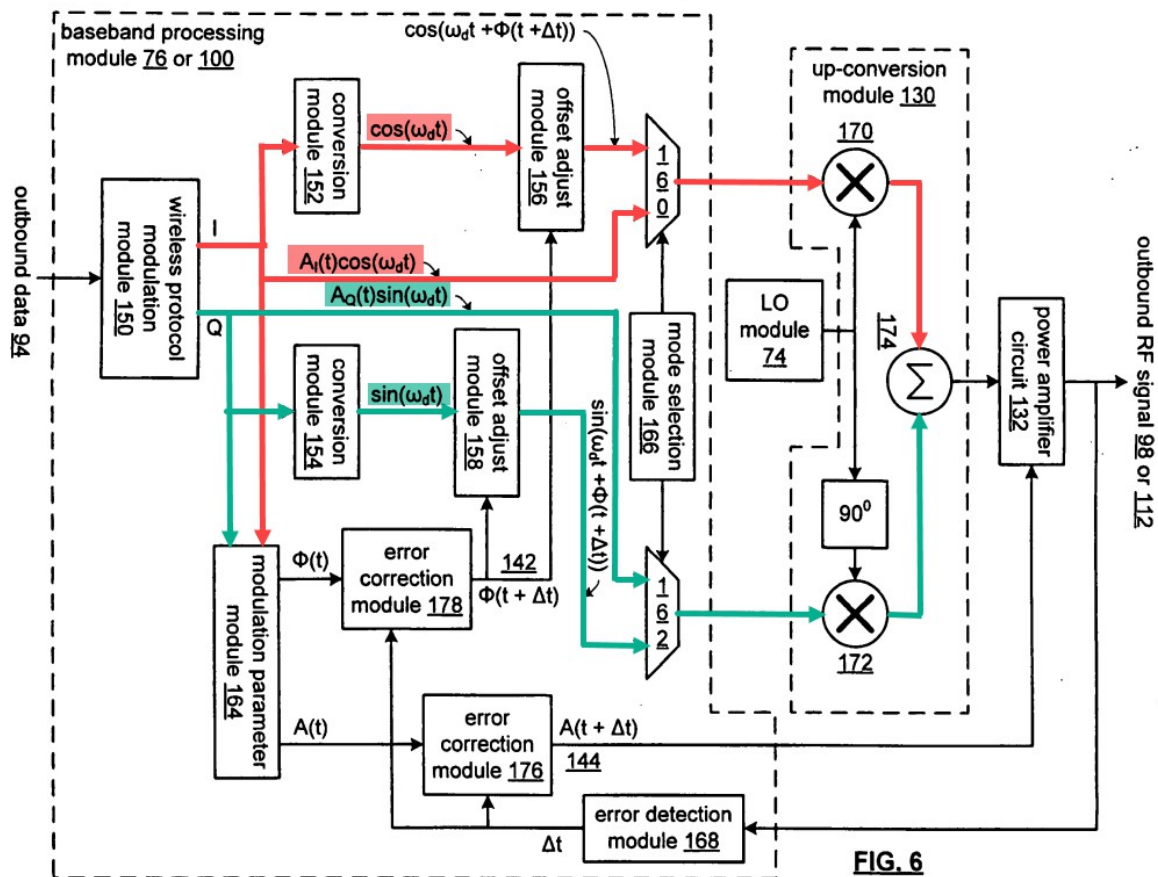
Figures 4 and 5 below explain the technical teaching of the patent in suit using a schematic block diagram that illustrates an embodiment of the programmable hybrid transmitter with its two different operating modes. Figure 4 shows the programmable hybrid transmitter in its first mode and Figure 5 shows the programmable hybrid transmitter in its second mode.



In the first mode, according to Figure 4, the outgoing data (94) is converted by a baseband processing module (76/100) into a complex signal (138), wherein the complex signal has a real and an imaginary component (para. [0042]). The complex signal (138) is then mixed by an upconversion module (130) with the signal of a higher frequency local oscillator, thereby generating the upconverted signal (146) is generated (para. [0043]). Finally, the up-converted signal (146) is amplified by a power amplifier circuit (132) to generate the outgoing RF signal in the first mode (para. [0043]).

In the second mode, as shown in Figure 5, the outgoing data (94) from the baseband processing module (76/100) is converted into a normalised complex signal (140), offset information (142) and transmission characteristic information (144) (para. [0044]). The normalised complex signal has a normalised real component and a normalised imaginary component, which are normalised to a desired value (e.g. 1) (paras. [0046] and [0051]). Offset information (142) may include, for example, phase modulation data, frequency modulation data, frequency hopping data and/or channel selection data (para. [0045]). Transmission characteristic information (144) may include, for example, amplitude modulation data and/or power control data (para. [0045]). The normalised complex signal (140) is then mixed by the upconversion module (130) with the signal of a higher frequency local oscillator, thereby generating a normalised upconverted signal (148) (para. [0046]), which is finally amplified by the power amplifier circuit (132) based on the transmission characteristic information (144) to generate the outgoing RF signal in the second mode (para. [0047]).

Figure 6 shows further details of the specific technical design of the programmable hybrid transmitter according to the embodiment shown in Figures 4 and 5.



6. Patent claim 1, feature group 1 with features 1.1.1 and 1.1.2

Feature 1.1.2 reads: "to convert the outbound data (94) into at least one of: a normalised complex signal (140), offset information (142), and transmit property information (144) when the programmable hybrid transmitter is in a second mode (136);"

a) Sub-feature "at least one of ..."

In the English language, a list of elements with the wording "at least one of: A, B, and C" must be distinguished from a list of elements with the wording "at least one of: A, B, or C". The use of the word "and" can be understood to mean that in feature 1.1.2, the elements listed are to be understood cumulatively in the sense of "at least one of A, and at least one of B, and at least one of C". In contrast, when the word "or" is used, the listed elements are to be understood as alternatives in the sense of "at least one of A, or at least one of B, or at least one of C".

The applicant considers that feature 1.1.2 would be fulfilled if the outgoing data were converted into a normalised complex signal (application, page 40, paragraph 137).

The defendants are of the opinion that feature 1.1.2 would already be fulfilled if, in the second mode, "the outgoing data were converted into a normalised complex signal and/or offset information and/or transmission characteristic information" (statement of defence, page 16, paragraph 137).

However, these views cannot be accepted when considering all the features of claim 1 as a whole.

Features 1.2.2 and 1.3.2, like feature 1.1.2, characterise the hybrid transmitter in the second mode. In particular, feature 1.2.2 refers to "normalised complex signal" and "offset information" with a definite article, and feature 1.3.2 refers to "transmission property information" with a definite article.

Thus, all elements listed in feature 1.1.2 in conjunction with the further features 1.2.2 and 1.3.2 are claimed as mandatory and therefore cumulative. Consequently, feature 1.1.2 is to be interpreted as meaning that the expression "at least one of: a normalised complex signal (140), offset information (142), and transmission property information (144)" actually refers to at least one combination of all three elements mentioned in feature 1.1.2, consisting of "normalised complex signal (140)" and "offset information (142)" and "Transmission property information (144)". Thus, when the programmable hybrid transmitter is in the second mode, the baseband processing module converts the outgoing data into a normalised complex signal (140) and into offset information (142) and transmission characteristic information (144).

Nothing else can be inferred from the understanding conveyed to the skilled person by the description and the embodiments of the hybrid transmitter according to the patent in suit shown in Figures 5, 6 and 9.

Paragraph [0045] reads as follows: "*In this mode, the baseband processing module 76 or 100 converts the outbound data 94 into a normalised complex signal 140, offset information 142, and transmit property information 144*".

b) Sub-feature "complex signal"

As the defendants correctly point out, according to the understanding of the relevant specialist, a complex signal according to the patent in suit is present if the signal has a real component and an imaginary component, i.e. is divided into two signal components (para. [0042]). A complex signal within the meaning of the patent in suit may, for example, have an in-phase signal component (I) and a quadrature signal component (Q).

The skilled person can deduce from the patent in suit that by linking the in-phase signal component (I) with the cosine and the quadrature signal component (Q) with the sine, the two signal components of the complex signal are shifted by 90 degrees relative to each other and are thus orthogonal or "in quadrature" to each other.

Furthermore, it is generally known to those skilled in the art that dividing the signal to be transmitted into two orthogonal signal components simplifies circuits of

high-frequency transmitters by means of quadrature modulation ("*I/Q modulation*") (see also Annex B 3, page 10).

The patent in suit also points out that no additional negative frequencies arise in the I and Q signals of a Cartesian transmitter and that the Cartesian transmitter therefore has the advantages of a single sideband transmitter (para. [0009]).

The two embodiments of the hybrid transmitter shown in detail in Figures 6 and 9 show that the two signal components of the complex signal are routed and processed separately in the baseband processing module until they are summed at the output of the upconversion module.

This is indicated in Figure 6 of the patent in suit shown above by colour highlighting the separate processing paths for the I signal component (red) of the complex signal and the Q signal components (green) of the complex signal.

The same fact regarding the processing of the complex signal in separate processing paths can also be seen in Figure 9.

Furthermore, the patent in suit conveys that it is disadvantageous for a polar coordinate-based transmitter to use real signals for baseband processing and that possible negative frequencies must therefore be taken into account (para. [0012]).

In summary, it is clear to the skilled person that the protected teaching of the patent in suit relates to the processing of complex signals in the baseband processing module according to the invention, wherein the complex signal is divided into two orthogonal signal components, the two signal components are each processed in separate paths and are only recombined into a single signal at the output of the upconversion module by summation, wherein this combined signal is in turn fed to the power amplifier circuit to generate the outgoing RF signal.

The defendants are therefore correct in stating that a complex signal necessarily has a real and an imaginary component, whereby in signal processing the two signal components are treated as real signals and consequently passed on to their own respective signal paths (statement of defence dated 18 October 2023, page 19, 4th paragraph). Therefore, contrary to the plaintiff's view, a signal that can be described by the instantaneous value of the amplitude and the instantaneous value of the phase is not a complex signal within the meaning of the patent in suit.

In order to transmit the information contained in the outgoing data, the complex signal is modulated according to a modulation scheme of a data transmission standard. In accordance with the respective modulation scheme, instantaneous values are assigned to the real and imaginary components of the complex signal, whereby the information contained in the outgoing data is carried by the amplitude and phase information of the complex signal.

c) Sub-feature "normalised complex signal"

Based on the interpretation of the term for the complex signal, which necessarily has a real and an imaginary component, the normalisation of the complex signal

according to the patent in suit can be carried out by setting the amplitude of the real component and the amplitude of the imaginary component to a desired value (e.g. 1) (paragraph [0046]).

The normalisation of the complex signal can be carried out in accordance with the embodiment shown in Figure 6 for the real component by means of "conversion module 152" and for the imaginary component by means of "conversion module 154" (paragraph [0051]).

The defendant's statements that the presence of a complex signal provides for normalisation for each of the two signal components are to be agreed with (duplicate – request for amendment of the patent, page 11, 2nd paragraph).

When normalising a complex signal in accordance with paragraphs [0050] and [0051] of the patent in suit, its I component and Q component are normalised by setting the amplitude $A_I(t)$ of the I component and the amplitude $A_Q(t)$

of the Q component are each set to the value 1, the measures of the

Normalisation results in the amplitude of the normalised I component and the amplitude of the normalised Q component no longer changing over time.

In simple terms, the normalisation of a complex signal with the I component $A_I(t) \cos(\omega_{\text{dln}} t)$ and the Q component $A_Q(t) \sin(\omega_{\text{dln}} t)$ as follows:

$$\begin{array}{l} A_I(t) \cos(\omega_{\text{dln}} t) \xrightarrow{\text{Normalisierung der I-Komponente}} \cos(\omega_{\text{dln}} t) \\) \\ A_Q(t) \sin(\omega_{\text{dln}} t) \xrightarrow{\text{Normalisierung der Q-Komponente}} \sin(\omega_{\text{dln}} t) \\) \end{array}$$

In this representation, $A_I(t)$ denotes the amplitude of the I component, $A_Q(t)$ denotes the amplitude of the Q component, and ω_{dln} is the radian of the data. In particular, ω_{dln} can correspond to the frequency

of the nth subcarrier of an OFDM signal ("Orthogonal Frequency Division Multiplexed") (paragraph [0050]).

d) Sub-features "transmission property information" and "offset information"

If, by normalising the complex signal, the two amplitudes $A_I(t)$ and $A_Q(t)$ are each set to the value 1, it is immediately apparent to the expert that at a given point in time, the respective amplitudes A_I and A_Q of the complex signal Amplitude information contained $\sqrt{A_I^2 + A_Q^2}$, for example, amplitude modulation data, and the phase information $\text{atan}\left(\frac{A_Q}{A_I}\right)$, for example phase modulation data, (para. [0052]).

Consequently, it is also clear to the skilled person that normalising the complex signal results in a loss of information and that additional measures are required to counteract this loss of information caused by normalisation.

According to the teaching of the patent in suit, these additional measures are based on those transmit *property* information ("*transmit property information*") and those offset

information ("*offset information*") directly related to the normalisation of the complex signal.

To avoid loss of information, the amplitude changes caused by the normalisation of the complex signal are taken into account by the transmission property information, and the phase changes caused by the normalisation of the complex signal are taken into account by the offset information.

Thus, it is understood by those skilled in the art that the manipulation of the real and imaginary signal components associated with the normalisation of the complex signal changes the amplitude information and phase information contained in the complex signal. According to the teaching of the patent in suit, the claim features "transmission characteristic information" and "offset information" serve the purpose of preserving the amplitude information and phase information in the normalised complex signal so that the signal changes deliberately made during the normalisation of the complex signal can be reversed at a later point in time based on the transmission characteristic information and the offset information at another point in the transmission path.

By normalising the complex signal in the baseband processing module, which is the essential measure of the invention, the amplitudes $A_I(t)$ of the real I component and the amplitudes $A_Q(t)$ of the imaginary Q component of a normalised complex signal are uniformly normalised to a desired value.

This has the advantage of reducing the linearity requirement for mixers and power amplifiers in the transmission path, which is otherwise considered disadvantageous in Cartesian transmitters, in the hybrid transmitter according to the patent in suit.

As a result of the reduced linearity requirement for mixers and power amplifiers, a Cartesian transmitter with complex signal processing in the baseband can be improved to the extent that the reduced linearity requirement means that the output power of the power amplifier is less severely limited. At the same time, a loss of data resolution is prevented (para. [0009]).

e) Sub-feature "outbound data"

The sub-feature "*outbound data*" is mentioned in features 1.1.1 – concerning the first mode – and 1.1.2 – concerning the second mode – with identical reference symbols "94". In conjunction with the overall disclosure, the skilled person will recognise that the same data is affected in each case, which, depending on the mode selected, is converted into either a complex signal or a normalised complex signal, offset information and transmission characteristic information before mixing, amplification and transmission. The choice of mode depends on the respective transmission requirements placed on the hybrid transmitter. According to the invention, changing the mode makes it possible to meet different transmission requirements with one and the same hardware. Therefore, in principle, any information that is available as outgoing data must have the opportunity to be treated either according to the first mode or according to the second mode, depending on the transmission requirements.

7. Patent claim 1, feature group 1.2 with features 1.2.1 and 1.2.2

Feature group 1.2 relates to the design of the *up-conversion* module ("*up-conversion module 130*"), which, in light of the description, which provides for separate processing of the complex signal into a real and an imaginary component in all embodiments of the hybrid transmitter, is essentially realised by a unit for quadrature modulation ("*I/Q modulation*"). The real component of the complex signal is mixed with the high-frequency oscillation of a local oscillator ("*LO module 74*") by means of a first mixer ("*mixer 170*") and the imaginary component of the complex signal is mixed by means of a second mixer ("*mixer 172*") with a high-frequency oscillation of the local oscillator shifted by 90 degrees, whereby in the upconversion module the upconverted signal is produced by summing the upconverted real component and the upconverted imaginary component of the complex signal. The hybrid transmitter utilises the advantages of the quadrature modulation ("*I/Q modulation*") of a Cartesian transmitter (para. [0009]).

The scope of protection does not cover embodiments of the upconversion module in the form otherwise customary in polar-based transmitters. According to the teaching of the patent in suit, the skilled person considers it disadvantageous if, as is customary in a polar-based transmitter, the modulation of the upconverted signal is performed in the upconversion module by a local oscillator in conjunction with a *phase-locked loop (PLL)* (paragraphs [0011] and [0012]).

With regard to feature 1.2.2, the defendant's view that the offset information does not have to be fed into the normalised complex signal only during the upconversion process is correct (duplicate – request for amendment of the patent, page 13).

The patent in suit assumes in particular that mixing according to the invention pursuant to feature 1.2.2 based on offset information is also present if the normalised complex signal to be upconverted already contains offset information.

According to both embodiments of the hybrid transmitter, the offset information is already added to the normalised complex signal in the baseband processing module. Figure 6 shows corresponding modules in the respective paths of the normalised real component ("*offset adjust module 156*") and the normalised imaginary component ("*offset adjust module 158*"), which add the offset information to the normalised complex signal in the baseband processing module (paragraph [0045]). Similarly, according to Figure 9, the hybrid transmitter has corresponding modules in the respective paths of the normalised real component ("*error adjust module 208*") and the normalised imaginary component ("*error adjust module 210*") in the baseband processing module in order to include information concerning a phase error in the offset information already contained in the respective paths of the normalised real component ("*error adjust module 208*") and the normalised imaginary component ("*error adjust module 210*") (paragraph [0072]). According to the invention, feature 1.2.2 serves the purpose of restoring the original phase information in the normalised complex signal based on the offset information available at the time of up-conversion.

8. Patent claim 1, feature group 1.3 with features 1.3.1 and 1.3.2

According to feature 1.3, the programmable hybrid transmitter also has a *power amplifier* module that amplifies the up-converted signal in the respective mode to generate an outgoing RF signal. The special feature of the second mode is that the power amplifier circuit amplifies the normalised up-converted signal based on the transmission characteristic information. Based on the understanding conveyed to the skilled person by the patent specification, feature 1.3.2 serves the purpose, according to the invention, of in the second mode, amplifying the normalised up-converted signal based on the transmission characteristic information to such an extent that the amplitude of the outgoing RF signal again corresponds to the original amplitude present before the complex signal was normalised.

9. Summary of patent claim 1

Based on these considerations, the Local Chamber concludes that in feature 1.1.2 the offset information and the transmission characteristic information are necessarily directly related to the normalisation of the complex signal and, in this context, describe the extent of the phase information and amplitude information changed during the normalisation of the complex signal. Based on this assessment, feature 1.1.2 actually requires, mandatorily and cumulatively, all three elements mentioned, consisting of "normalised complex signal (140)", "offset information (142)" and "transmission property information (144)". Based on this understanding, it is not detrimental that, in addition to the *offset* information and *transmit property* information directly related to the normalised complex signal, there is also further offset information, such as phase modulation data, frequency modulation data and/or channel selection data (para. [0045]) and other transmit property information, such as amplitude modulation data and/or power control data (para. [0045]), can also be added.

III. Patent claim 7

The steps of the method claimed in claim 7 correspond in essence to those of claim 1. Thus, the subject matter of the parallel claim 7 is subject to the same assessment as that of claim 1.

The outgoing RF signal must always contain the amplitude and phase values corresponding to the outgoing data in accordance with the modulation scheme specified by the respective data transmission standard. As a result of the normalisation process, the phase and amplitude values in the normalised complex signal are altered and must be corrected in the transmission path. The correction of the phase values is based on the offset information and takes place in the upconversion module. The correction of the amplitude values is based on the transmission characteristic information and takes place in the power amplifier module. Offset information and transmission characteristic information are not arbitrary, but are directly related to the conversion of the outgoing data into a normalised complex signal. They are used to correct the

Normalisation of the complex signal to correct the altered amplitude and phase values.

C. Validity

The subject matter of the patent in suit and the auxiliary requests is invalidated by citation D3 (WO 2007/010091 A1, Murtojärvi, "*Multimode transmitter module, communication device and chip set*", published on 25 January 2007, filed on 12 July 2006, priority from 15 July 2005). The patent in suit is therefore to be declared invalid in its entirety.

I. Art. 54 (3) EPC

According to Art. 54 (3) EPC, an invention is considered new if it does not form part of the state of the art. In order to be considered part of the state of the art in this sense, an invention must be disclosed directly and unambiguously in a single document of the state of the art. It must be identical in its essential elements, in the same form, with the same arrangement and with the same features. The lack of novelty also requires that the subject-matter of the invention be directly and unambiguously derived from the prior art. This applies to all claim features. The standard for the disclosure content of a publication is what an average person skilled in the relevant field can and may know and understand (ACT_547520/2023 UPC_CFI_233/2023 (LK Munich), GRUR-RS 2024, 19369).

Based on this examination standard, the subject matter of patent claims 1 and 7 is anticipated by D3 in a manner that destroys novelty.

II. Document D3 (WO 2007/010091 A1)

1. D3 is prior art within the meaning of Article 54(3) EPC.

2. D3 discloses a transmitter that is capable of meeting the requirements of different communication standards for wireless data transmission by using different modes ("*multimode transmitter*").

To this end, it is capable of transmitting data using a first standard and, after a mode change, using a second standard. With regard to the technical background, D3 states that a large number of different standards existed in the prior art which specified how data was transmitted in wireless communication systems (D3, para. [0002]). However, it is necessary to further simplify the structure of the transmitters compared to the prior art in order to save production costs and enable smaller, lighter end devices (D3, para. [0003]). The transmitter of D3 is therefore intended to be suitable for various communication standards for wireless data transmission. However, in order to fulfil the aforementioned purpose of keeping the devices as small as possible, it largely dispenses with the use of duplicate components. The signals to be processed are thus routed through common components and generated or processed by these components, regardless of the communication standard used.

Figure 3 discloses the function of the claimed features 1.1.1, 1.2.1 and 1.3.1, which each relate to the first mode of the hybrid transmitter according to the patent in suit.

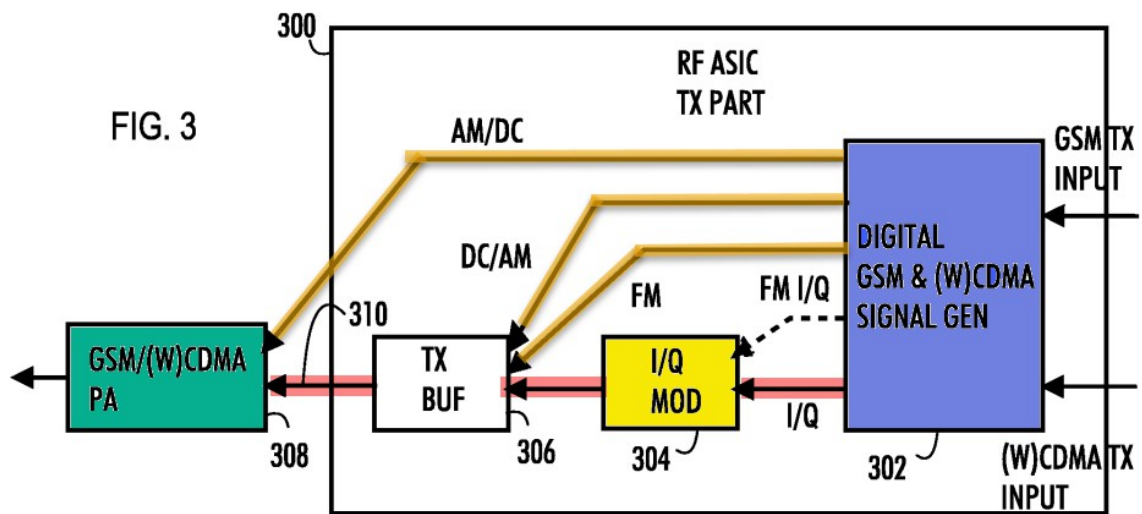


Figure 3 shows the elements for signal generation ("DIGITAL GSM & (W)CDMA SIGNAL GEN"; highlighted in blue), signal modulation ("I/Q MOD"; highlighted in yellow) and signal amplification ("GSM/(W)CDMA PA"; highlighted in green). The various paths for transmitting signals or signal components within the transmitter are also shown. According to Figure 3, after being generated in the function block highlighted in blue, the signal intended for transmission is forwarded via the path (highlighted in red) located in the lower half of the image. Other signal components, which represent information for processing the signal to be transmitted, for example, can run via various paths (highlighted in orange) located in the upper half of the image. These paths represent different options and do not all have to be used in one design (see D3, para. [0048]: "Then, depending on the communication standard according to which a signal is generated and modulated, there are several options for signal processing: [...]").

Figure 6 also discloses features 1.1.2, 1.2.2 and 1.3.2 of the hybrid transmitter in the second mode according to the patent in suit, which is based on the processing of a normalised complex signal.

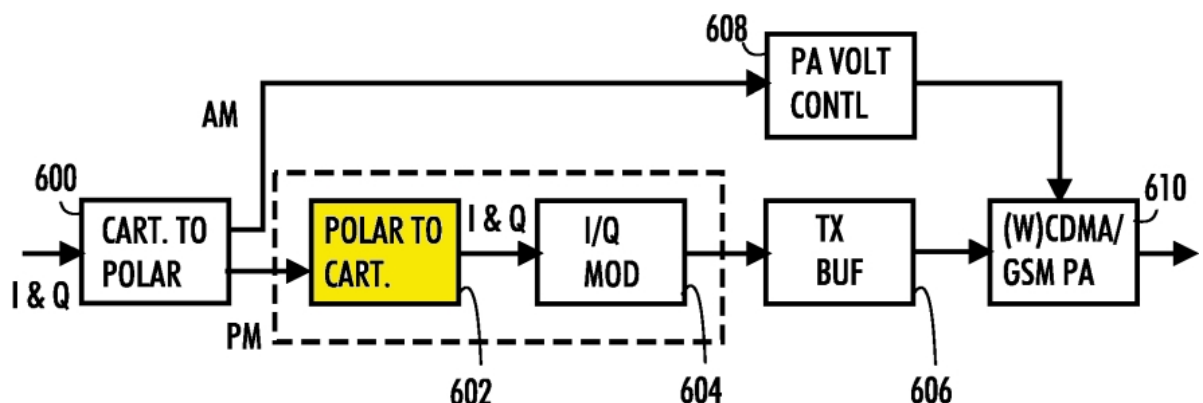


FIG. 6

The complex signal is normalised by a first unit ("*Cartesian to Polar to Cartesian conversion block 600*") in conjunction with a second unit ("*Polar to Cartesian conversion block 602*"). A complex signal is fed to the first unit, from which amplitude (*AM*) and phase (*PM*) information is obtained. The amplitude information is to be understood as information on the required transmission characteristics and controls the amplification of the power amplifier circuit ("*power amplifier 610*"). The phase information is converted by the second unit ("*Polar to Cartesian conversion block 602*") into a normalised complex signal ("*I&Q*"), which is fed together with the phase information to the upconversion module ("*I/Q modulator 604*"). The phase information can be understood as offset information in the sense of the requirements.

The normalised complex signal ("*I&Q*") in Figure 6, as the output signal of the second unit ("*Polar to Cartesian conversion block 602*"), is referred to in the description (para. [0065] - "*The generated FM I/Q signals are then fed to I/Q modulator 604*") as the "*FM I/Q*" signal.

This signal, designated "*FM I/Q*", is also shown in the block diagram in Figure 3, whereby the representation of the signal flow as a dashed line conveys to the specialist that this signal ("*FM I/Q*") can be fed to the signal modulation element ("*I/Q MOD*") as an alternative input signal.

Figure 6 does not show the function of the hybrid transmitter in the first mode at the same time, and Figure 3 does not show the function of the hybrid transmitter in the second mode at the same time. However, both figures show different types of modulation that one and the same hybrid transmitter is capable of using [0050]. The disclosure is linked in this respect by the textual description. The skilled person recognises that the citation relates specifically to a multimode transmitter [0001; 0042], i.e. a programmable [0091] device which, using the same components and in accordance with the respective transmission requirements, can selectively process signals with a high energy level and those with a lower energy level by switching between modes [0074]:

"Furthermore, it should be noted that the multimode transmitter described above can be implemented by using one or more programmable integrated circuits (routers, for instance, may be programmable), since one advantage of the invention is that the same signal generator may be used to generate signals according to different standards."

D3, paragraph [0091]

This is also illustrated by Figure 10, referred to by the defendants, which shows the configuration of the hybrid transmitter in different modes according to the respective transmission requirements:

The following diagram shows the configuration of the hybrid transmitter in a first mode. In this mode, the first unit ("*Cartesian to Polar to Cartesian conversion block 600*") and the second unit ("*Polar to Cartesian conversion block 602*") are bypassed by means of appropriate programming, and the complex signal ("*I&Q*") is fed directly to the upconversion module ("*I/Q modulator 1004*") (para. [0079] - "*Original I and Q signals are conveyed to block 1000 and/or block 1004 on the basis of the required modulation*"). In the diagram, the signal processing of the complex signal in the transmission path is highlighted in red.

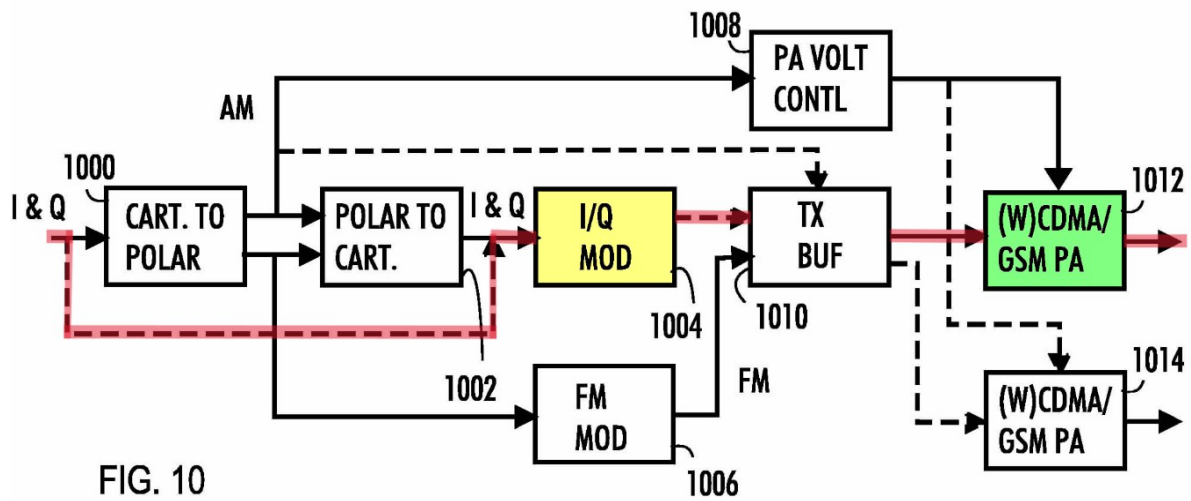


FIG. 10

It is immediately apparent to the expert that this configuration of the hybrid transmitter highlighted in Figure 10 corresponds in the first mode to that shown in Figure 8, which, according to the description (para. [0074]), is intended for signals with low energy levels. In the following illustration of Figure 8, the signal processing of the complex signal in the transmission path is highlighted in red.

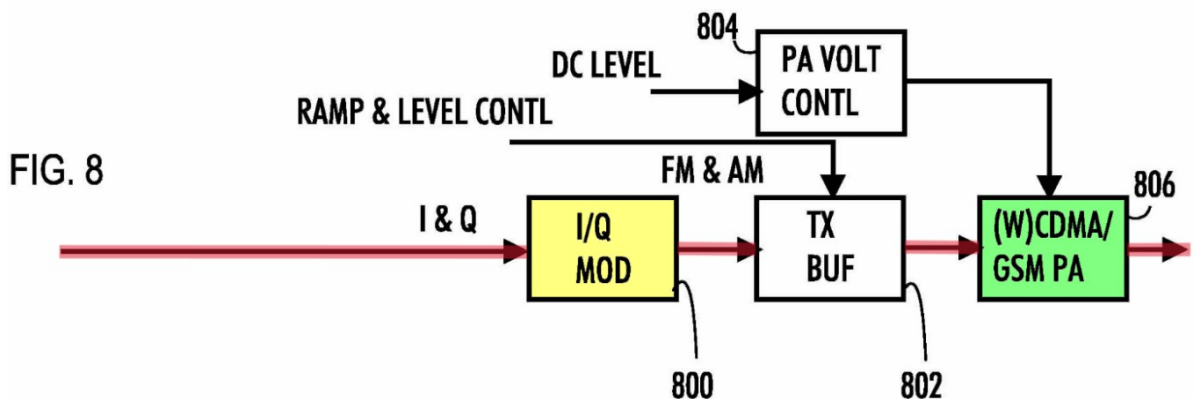


FIG. 8

The configuration of the hybrid transmitter in another mode is also shown in Figure 10, whereby in this configuration the complex signal ("I/Q") is fed to the upconversion module ("I/Q modulator 1004") via the first unit ("Polar to Cartesian conversion block 600") and the second unit ("Polar to Cartesian conversion block 602") (para. [0079] – "Original I and Q signals are conveyed to block 1000 and/or block 1004 on basis of the needed modulation"). The signal-processing first and second units upstream of the upconversion module ("I/Q modulator 1004") are to be assigned to the claimed baseband processing module and are shown in blue-coloured blocks. The complex signal fed to the signal processing as the input signal of the first unit is highlighted in red, and the complex signal output by the signal processing of the second unit, including further signal processing in the transmission path, is highlighted in blue.

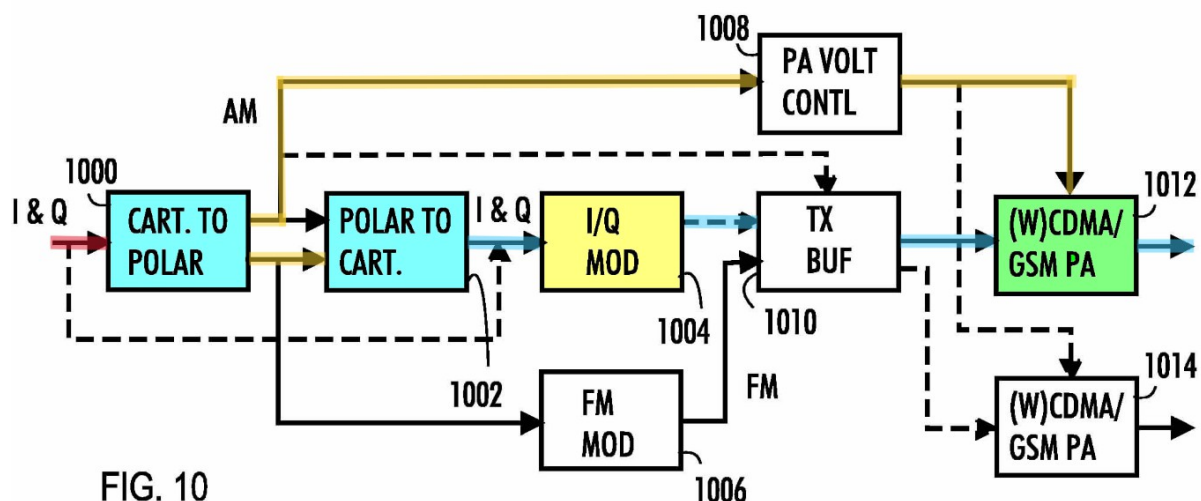


FIG. 10

It is readily apparent to those skilled in the art that the configuration of the hybrid transmitter highlighted in Figure 10 also includes the mode shown in Figure 6, which, according to the description (para. [0074]), is intended for signals with high energy levels. As previously explained with reference to Figure 6, the complex signal is normalised by the first unit ("Cartesian to Polar to Cartesian conversion block 600") in conjunction with the second unit ("Polar to Cartesian conversion block 602"), so that in this mode, claim-compliant transmission characteristic information and a claim-compliant normalised complex signal are fed together with the phase information as claim-compliant offset information to the upconversion module ("I/Q modulator 604"). In the following illustration in Figure 6, the further signal processing of the normalised complex signal in the transmission path is highlighted in blue.

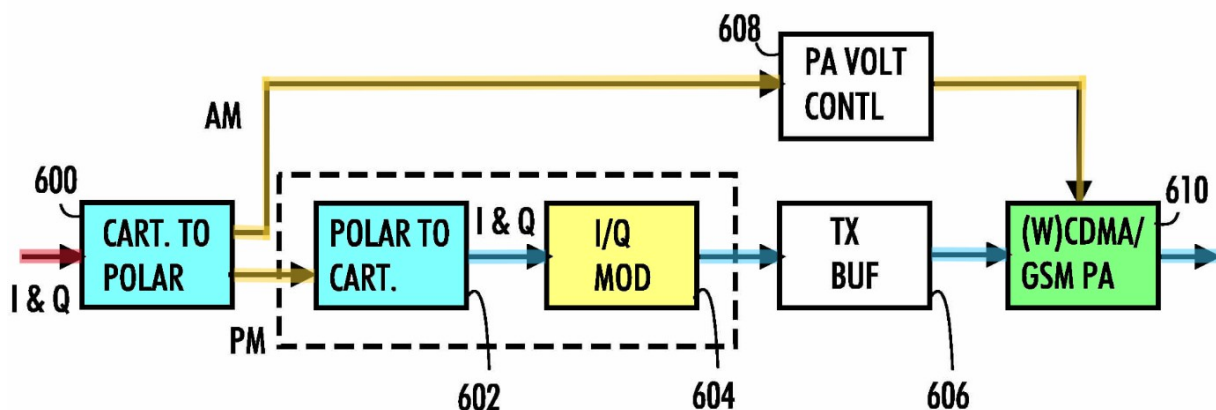
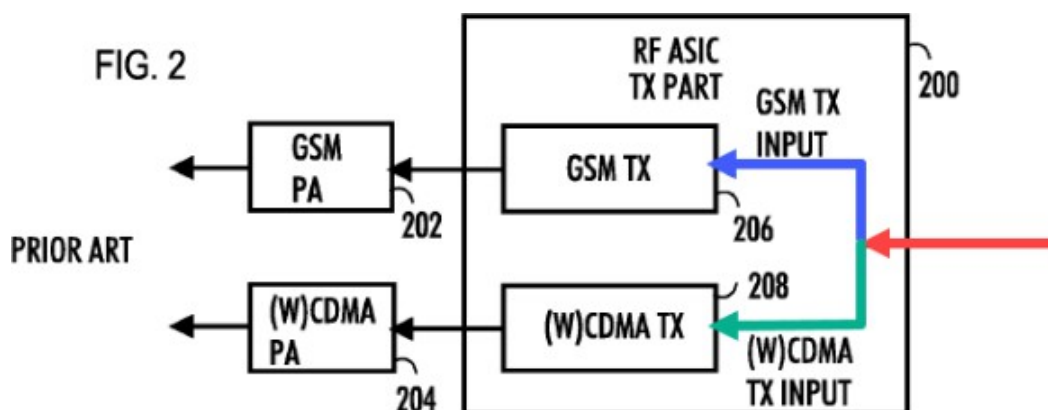


FIG. 6

3. Contrary to the claimant's opinion, the expert also concludes from D3, directly and unambiguously, that the input signals "GSM TX Input" and "(W)CMDA TX Input" are signals that originate from the same outgoing data. These are simply two possible input signals that are generated from outgoing data.

depending on which standard is to be used. The skilled person can already see this from paragraph [0045] of D3 cited by the applicant, which reflects this distinction ("*intended to be transmitted according to the GSM standard*" as opposed to "*intended to be transmitted according to the WCDMA standard*"). Furthermore, it can also be seen from Figure 2 (representation of the prior art) that although these two signals may be different in design, they originate from the "same data" – as assumed by the applicant. This is because the two signals ("*GSM TX Input*" highlighted in blue; "*(W)CDMA TX Input*" highlighted in green) originate from a single source, i.e. from the "same outgoing data" (highlighted in red) (see D3, Figure 2; emphasis added):



The skilled person would also not consider the plaintiff's interpretation. This is because this reading of D3 would imply that D3 could not flexibly transmit a data set according to different communication standards. This seems completely remote in view of the task set by D3.

4. Furthermore, the skilled person would also immediately and unambiguously infer from D3 a disclosure of an up-conversion in the first mode as well as in the second mode (based on offset information). The plaintiff argues in this regard that Figure 3 of D3 does not disclose how the "frequency-modulated signal" is generated (NWK response, p. 17, para. 71). Mixing based on offset information as claimed does not take place in the embodiment of Figure 6 (NWK response, p. 19, para. 79). This is incorrect.

Paragraph [0048] of D3 concerning Figure 3 mentions two options, according to which, among other things, an "I/Q modulator" can generate a signal that is frequency-modulated (cf. D3, para. [0048], emphasis added):

[0048] Then, depending on the communication standard according to which a signal is generated and modulated, there are several options for signal processing:

- 1) AM and FM signals are combined in power amplifier 308,
- 2) AM and FM signals are combined in buffer 306,
- 3) FM signals are conveyed to buffer 306, and from the buffer to power amplifier 308,
- 4) FM I/Q signals are conveyed to an I/Q modulator. If frequency modulation is performed by using a synthesizer, strict requirements for tolerances of a voltage-controlled oscillator, a loop filter of a phase lock loop, predistortion and amplification of a phase comparator exist. These requirements are not valid if a frequency modulated signal is generated by an I/Q modulator, but instead, the generated signal has a worse signal-to-noise ratio. Hence, depending on the case, a frequency modulated signal is generated either by a synthesizer or an I/Q modulator,
- 5) conventional I/Q modulation is used,
- 6) conventional I/Q modulation is used to compress a power amplifier and amplitude modulated signals are combined in a power amplifier 308.

With regard to Figure 6, D3 explicitly describes a phase rotation in the course of frequency modulation (D3, paragraph [0065]: "[...] *with wanted phase rotation*"), so that the upconversion is also based on offset information.

Furthermore, the skilled person reads the block "*I/Q MOD*" 304 (highlighted in yellow) in the block diagram of the transmitter shown in simplified form in Figure 3 and, based on their expertise, sees this block "*I/Q MOD*" 304 as being implemented with a generally known quadrature modulator, to which the two orthogonal signal components I/Q of a complex baseband signal are fed as input signals in order to perform an up-conversion of the complex baseband signal.

The same applies to the block "*I/Q MOD*" shown in Figures 6, 8 and 10 with reference numbers 604, 800 and 1004, respectively, which the expert readily recognises as a quadrature modulator.

Furthermore, as the defendants have correctly pointed out, it can be inferred from paragraph [0087] that the up-conversion can also take place as part of the *I/Q modulation*.

In summary, the Local Chamber concludes that Figures 3, 6, 8 and 10 of Document D3 form a uniform disclosure. The block diagram in Figure 3 shows a programmable hybrid transmitter according to the claim with a baseband processing module, an up-conversion module and a power amplifier circuit at the highest level of abstraction. Figure 10 discloses the detailed design of the programmable hybrid transmitter that supports both modes according to the claims. The configuration of the programmable hybrid transmitter according to the claims in the first mode is shown in Figure 8, and Figure 6 shows the configuration of the programmable hybrid transmitter according to the claims in the second mode.

III. Auxiliary request

In a written submission dated 2 January 2024, the plaintiff requested, in the alternative, that the patent in suit be amended and maintained in accordance with Rule 30 of the Rules of Procedure on the basis of the attached set of claims. The attached set of claims is intended (in the alternative) to replace the original feature 1.1.2 in claim 1 with the new feature 1.1.2bis as follows:

	EN	EN
1.1.2 bis	to convert the outbound data (94) into: a normalised complex signal (140), offset information (142), and transmit property information (144) when the programmable hybrid transmitter is in a second mode (136);	converting the outgoing data (94) into: a normalised complex signal (140), offset information (142) and transmission characteristic information (144) when the programmable hybrid transmitter is in a second mode (136);

In the plaintiff's view, the alternatively asserted amendment makes it clear that all three (and not just at least one of them) – normalised complex signal, offset information and transmission characteristic information – are the result of the conversion of outgoing data.

A corresponding amendment is also made to the corresponding method claim 7, whereby, in the alternative, the original feature 7.1.2 in claim 7 is to be replaced by the new feature 7.1.2bis as follows:

	EN	EN
7.1.2 bis	converting, by the baseband processing module (76, 100), the outbound data (94) into: a normalised complex signal (140), offset information (142), and transmit property information (144) when the programmable hybrid transmitter is in a second mode (136);	converting, by the baseband processing module (76, 100), the outbound data (94) into: a normalised complex signal (140), offset information (142) (144) transmission characteristic information (144), when the programmable hybrid transmitter is in a second mode (136);

The interpretation of the original claim 1 set out above shows that offset information and transmission characteristic information are necessarily directly related to the normalisation of the complex signal and describe the extent of the phase information and amplitude information changed during the normalisation of the complex signal. The interpretation of the original claim 1 as presented from the perspective of a person skilled in the art already takes into account the circumstance clarified in the auxiliary request that the normalised complex signal, offset information and transmission characteristic information are a result of the conversion of outgoing data. Thus, the interpretation of the amended claim 1 according to the auxiliary request does not result in any additional restriction of the claimed scope of protection. However, is carried out by the

clarification in feature 1.1.2bis, which prevents an incorrect interpretation of the claimed scope of protection.

This assessment does not reveal any deviations from the above result.

Based on this result, it can remain open whether the plaintiff submitted the auxiliary requests in due form and time.

IV. Dependent patent claims

The plaintiff defended the dependent claims solely on the basis of the patentability of independent claims 1 and 7. Since claims 1 and 7 are, as shown, prejudiced by D3 in terms of novelty, the independent claims cannot be upheld either.

D. Infringement

Due to the invalidity of the patent in suit, the infringement action already lacks a basis. It can therefore be left open whether, as the defendants argue, the patent in suit would not have been infringed even if it had been valid.

E. Legal consequences

In response to the counterclaims for revocation, European patent 1 838 002 is to be revoked for the territory of the Federal Republic of Germany. The infringement action is to be dismissed. The plaintiff is to bear the costs of the proceedings (Art. 69(1) EPC).

DECISION

1. The European patent 1 838 002 is declared invalid for the territory of the Federal Republic of Germany on the basis of the counterclaims for invalidity.
2. The requests for amendment of the patent in suit are rejected.
3. The infringement action is dismissed.
4. The plaintiff shall bear the costs of the proceedings.

INFORMATION ON APPEAL

Any party whose claims have been rejected in whole or in part may appeal against this decision to the Court of Appeal within two months of its notification (Art. 73(1) EPC, R. 220.1(a), 224.1(a) RPO).

INFORMATION ON ENFORCEMENT (ART. 82 EPGÜ, ART. 37(2) EPGS, R. 118.8, 158.2, 354, 355.4 VERFO):

A certified copy of the enforceable decision shall be issued by the Deputy Registrar at the request of the enforcing party, R. 69 RegR


INSTRUCTIONS TO THE REGISTRY

A certified copy of the decision shall be forwarded to the European Patent Office and the German Patent and Trade Mark Office as soon as the decision on the counterclaims for revocation has become final.

DETAILS OF THE DECISION

UPC number: UPC_CFI_52/2023
 Infringement action: ACT_462984/2023
 Counterclaims for annulment: CC_581179/2023, CC_581177/2023
 Applications for amendment of the patent: App_18580/2024, App_18557/2024

Announced in Munich on 30 August 2024.

<i>Dr Zigann</i> <i>Presiding Judge and Rapporteur</i>	Matthias ZIGANN  Digitally signed by Matthias ZIGANN Date: 27 August 2024, 09:42:32 +02'00'
<i>Dr Zhilova</i> <i>Legally qualified judge</i>	Tatyana Zhilova  Digitally signed by Tatyana Zhilova Date: 27 August 2024 12:20:30 +03'00'
<i>Pichlmaier</i> <i>Legally qualified judge</i>	TobiasGünther Pichlmaier  Digitally signed by Tobias Günther Pichlmaier Date: 27 August 2024, 12:21:21 +02'00'
<i>Loibner</i> <i>Technically qualified judge</i>	Klaus Loibner  Digitally signed by Klaus Loibner Date: 27 August 2024 10:01:40 +02'00'
<i>for the Deputy Chancellor</i>	Anja Mittermeier  Digitally signed by Anja Mittermeier Date: 27 August 2024, 12:42:05 +02'00'