

From the INTERNATIONAL SEARCHING AUTHORITY

To:

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing (day/month/year) 24 October 2017	
Applicant's or agent's file reference PN71755ZTE	FOR FURTHER ACTION See paragraph 2 below
International application No. PCT/CN2017/093717	International filing date (day/month/year) 20 July 2017
Priority date (day/month/year) 23 August 2016	
International Patent Classification (IPC) or both national classification and IPC H02M 3/335(2006.01)i	
Applicant ZTE CORPORATION	

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/	Date of completion of this opinion	Authorized officer

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International application No.

PCT/CN2017/093717

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - the international application in the language in which it was filed.
 - a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).
2. This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a)).
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:
 - a. (means)
 - on paper
 - in electronic form
 - b. (time)
 - in the international application as filed
 - together with the international application in electronic form
 - subsequently to this Authority for the purposes of search
4. In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

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International application No.

PCT/CN2017/093717

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>1-9</u>	YES
	Claims	<u>None</u>	NO
Inventive step (IS)	Claims	<u>None</u>	YES
	Claims	<u>1-9</u>	NO
Industrial applicability (IA)	Claims	<u>1-9</u>	YES
	Claims	<u>None</u>	NO

2. Citations and explanations :

- [1] D1: CN 102638167 A (15 August 2012)
- [2] D1 is the closest prior art, and discloses a resonant converter (see description, paragraphs [0040] to [0087], and figure 8), comprising two or more resonant units, each of the resonant units comprising bridge inverter circuits (D1, D2, S1, S2, Cin1; D5, D6, S5, S6, Cin2), resonant circuits (Cr1, Lr1; Cr2, Lr2), transformers (T1; T2), rectification circuits (D3, D4; D7, D8), and a filter circuit (Co), wherein an input end of a bridge inverter circuit is connected to an input end of a direct-current voltage V_{in} ; an output end of the bridge inverter circuit is connected to an input end of a resonant circuit; an output end of the resonant circuit is connected to a first input end of a primary side of a transformer; a first output end of a secondary side of the transformer is connected to an input end of a rectification circuit; and an output end of the rectification circuit is connected to the filter circuit.
- [3] D1 does not disclose the features of there being a polygonal connection or a star connection between second input ends of primary sides of transformers of two or more resonant units, and connection points of the primary sides of the transformers of the two or more resonant units are in a suspending state in claim 1; and the current processing method in claim 9. Therefore, claims 1 and 9 are novel and comply with PCT Article 33(2), and
- [4] accordingly, dependent claims 2-8 are also novel and comply with PCT Article 33(2).
- [5] Based on the above-mentioned distinguishing technical features, the technical problem to be actually solved by claim 1 is: to ensure that the amplitudes of currents of primary sides of transformers of two or more resonant units are equal. The above-mentioned technical means used are common connection methods in the art in order to ensure that the amplitudes of currents are equal, and are common general knowledge in the art.
- [6] The current processing solution in claim 9 is also a common technical means in the art, and is a common general knowledge in the art.
- [7] Therefore, claims 1 and 9 do not involve an inventive step and do not comply with PCT Article 33(3).
- [8] D1 discloses a bridge inverter circuit being a half-bridge inverter circuit, wherein the half-bridge inverter circuit comprises two first switch tubes S1 and S2; and a resonant circuit being an LLC series resonance. Therefore, D1 discloses the additional technical features of dependent claims 3, 5 and 6, and thus claims 3, 5 and 6 do not involve an inventive step and do not comply with PCT Article 33(3).
- [9] The additional technical features of claims 2, 4, 7 and 8 are common technical means in the art, and are common general knowledge in the art. Therefore, claims 2, 4, 7 and 8 do not involve an inventive step and do not comply with PCT Article 33(3).
- [10] The subject matter of claims 1-9 can be made and used in industry, is industrially applicable and complies with PCT Article 33(4).