

CLAIMS

1. An electrosurgical instrument for ablating biological tissue, the electrosurgical instrument comprising:
5 a tissue treatment portion for contacting the biological tissue to be treated, and
a handle connected to the tissue treatment portion via a flexible cable, wherein the tissue treatment portion forms a distal end assembly suitable for insertion through an
10 instrument channel of a surgical scoping device;
wherein the tissue treatment portion comprises:
a microwave power source comprising a power amplifier arranged to generate microwave energy suitable for ablating biological tissue; and
15 a radiating structure connected to the microwave power source and configured to deliver the microwave energy into the biological tissue, wherein
the power amplifier is connected to the radiating structure by a tunable transmission line.
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2. An electrosurgical instrument according to claim 1, wherein the power amplifier includes a wide band-gap semiconductor transistor.
- 25 3. An electrosurgical instrument according to claim 1 or 2, wherein the power amplifier includes a GaN-based HEMT.
4. An electrosurgical instrument according to any preceding claim, wherein the power amplifier has a class F
30 design.
5. An electrosurgical instrument according to any preceding claim, wherein the microwave power source comprises generator circuitry for driving the power amplifier.
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6. An electrosurgical instrument according to claim 5, wherein the generator circuitry comprises:
an oscillator arranged to receive a DC input signal and generate a microwave frequency signal; and

a driver amplifier arranged to receive the microwave frequency signal and generate an input signal for the power amplifier.

5 7. An electrosurgical instrument according to any preceding claim, wherein the tissue treatment portion includes a power source.

10 8. An electrosurgical instrument according to claim 7, wherein the power source is a cell for generating DC power.

15 9. An electrosurgical instrument according to claim 7, wherein the power source comprises a coupling unit for inductively or magnetically coupling power from an external supply.

20 10. An electrosurgical instrument according to claim 1, wherein the tunable transmission line has an adjustable electrical length.

 11. An electrosurgical instrument according to claim 1 or 10, wherein the tunable transmission line comprise an axially extendable coaxial structure.

25 12. An electrosurgical instrument according to claim 1 or 10, wherein the power amplifier is movable relative to the radiating structure along the tunable transmission line to adjust the electrical length thereof.

30 13. An electrosurgical instrument according to any preceding claim, wherein the tissue treatment portion is enclosed by a sleeve.