US 2019/0199137 A1 describes a wireless near-field microwave power transmission system. The wireless power transmission system uses a wireless power transmission device to wirelessly transmit power to a wireless power receiving device. The wireless power transmission device includes microwave antennas that extend along an axis in a staggered arrangement. In the staggered arrangement, the microwave antennas are arranged on alternate sides of the axis. Each microwave antenna extends along a direction that is perpendicular to the axis. Many antennas are in overlap with a wireless power receiving antenna in the wireless power receiving device. A control circuit uses an oscillator and an amplifier circuit to supply driver signals to the antennas that are in overlap with the wireless power receiving antenna. The driver signals may be adjusted based on feedback from the wireless power receiving device to increase power transmission efficiency. The system may include a wireless power transfer device with inductive power transfer coils.

US 2018/0041249 A1 describes an electrical power/data coupler. Such a data and power transmission network comprises an actuator and two power/data couplers. The actuator is connected to the electrical coupler, firstly to transmit electrical power via the power supply pins to the network via the third pin, or to receive data from the network via the fourth pin. This system also comprises a galvanic isolation transformer, a winding, which are connected to the first and the second power supply pins. In addition, the data transfer takes place via a first and a second transformer, which inductively transfer the data from the network to the system and, in turn, inductively transfer data to the network.

Embodiments of the present invention provide an electrical device with indirect lightning protection, in particular, for use in an attitude and heading reference system for air navigation and in an aircraft, which has a reduced size with high lightning protection requirements.

According to a first aspect of the present invention, there is provided an electrical device with indirect lightning protection, including: an electrically conductive housing, within which electrical components are accommodated, wherein the electrical components are adapted to provide attitude and heading reference data for air navigation, an electrical data interface, which is connected to the electrical components in order to transmit internal electrical signals from the components out of the housing, or to transmit external electrical signals into the housing to the components, an electrical power supply interface, which supplies electrical power to the electrical

components from an external power source, wherein the electrical data interface and the electrical power supply interface are configured in such a manner that the electrical components are galvanically isolated from the housing and from the input/output lines of the data interface and the power supply interface, so that damage to the components by a lightning-induced current pulse is prevented, andwherein the electrical data interface has an external data interface part that is connectable to a peripheral electrical conductor structure and an internal data interface part that is connected to the components, which are galvanically isolated, wherein data transmission between the external and the internal data interface parts is done optically, and wherein the electrical data interface includes potential equalization elements which are interconnected between two-core differential signal input/output lines in order to raise the input/output lines to the same electrical potential in the event of a lightning-induced voltage pulse to prevent a voltage flashover between the lines.

According to a second aspect of the present invention, there is provided an attitude and heading reference system for air navigation, including the above electrical device.

According to a third aspect of the present invention, there is provided an aircraft including the above electrical device.

In accordance with embodiments of the invention, an electrical device with indirect lightning protection is provided, which has an electrically conductive housing within which electrical components are accommodated. Furthermore, embodiments of the electrical device include an electrical data interface, which is connected to the electrical components in order