受験番号:38IPE005

問1.

[0008]　Here, in a case of applying the blockchain as a virtual currency to a trace of a contract agreement, a problem is how to prove that the contents of the contract were agreed between two or more parties.　An e-signature scheme used in the blockchain of the virtual currency is based only on an e-signature of the remittance source as described above and requires no e-signature of the remittance destination.　Meanwhile, in a case of a contract between two or more parties, the contract cannot be established by issuing the contract unilaterally, and the agreement of all stakeholders being the parties to the contract is required to be made.　However, one transaction forming the blockchain only includes an e-signature of the sender, and thus there is no trace of the agreement to the contract by the receiver in the transaction.

[0009]　As a simple solution to the above problem, for example, a method to include, in one transaction, e-signatures of all stakeholders is conceivable.　Virtual currencies use a multi-signature mechanism.　Such a mechanism allows an address to be created, the address requiring a certain number or more of e-signatures for the transaction to be approved.　However, the process of including a plurality of e-signatures in one transaction is complicated, such as which e-signature is required in advance, how a transaction before its approval is shared between the stakeholders, and where a plurality of private keys are collected for signing.

問2.

[0021]　In a planar component arrangement such as a surface-mounted product, the wiring between components tends to be redundant, but in the RFID tag using the multilayer printed wiring board as in the present invention, the wiring length can be shortened using the interlayer of the multilayer board, allowing power loss due to wiring resistance to be reduced.　This allows the RFID tag 10 to be downsized and the communication performance to be maintained.

[0022]　Now, the data communication principle of the RFID tag 10 will be described. When a radio wave is transmitted from an RFID reader/writer device (not illustrated) to the RFID tag 10 in order to read/write identification data of the RFID tag 10, reflection and interference occur in the radio wave because of the metal body 30 to which the RFID tag 10 is attached.　At this time, a surface wave is generated on a surface of the metal body 30 where the radio wave has collided with, and the surface wave is collected to the first antenna circuit 16a by the dielectric action. The surface wave collected by the first antenna circuit 16a is sent to the second antenna circuit 16b and the third antenna circuit 16c via the through hole 18, and a radio wave of a specific frequency resonates and is utilized. The resonant amplified radio wave of the specific frequency is sent the RFID tag chip 14. The RFID tag chip 14 that has received the radio wave places the data stored in the RFID tag chip 14 on the radio wave to return the radio wave to the RFID reader/writer device from the second antenna circuit 16b and the third antenna circuit 16c, and the RFID reader/writer receives the returned radio wave, thereby completing the data communication. In other words, the first antenna circuit 16a is an antenna circuit for capturing a surface wave generated on the metal body 30, and the second antenna circuit 16b and the third antenna circuit 16c are antenna circuits for resonating a radio wave collected by the first antenna circuit 16a at a specific frequency and sending the radio wave to the RFID tag chip 14, and for transmitting a radio wave with data in the RFID tag chip placed on.

[0023] Since the RFID tag 10 uses the metal body 30 as if it were an antenna circuit for collecting a radio wave transmitted from the RFID reader/writer device, the communication gain is higher than a case where an object to be attached is a non-metal body.

問3.

[Claim 1]

A semiconductor device comprising:

a semiconductor substrate having a high impurity concentration;

a parallel pn layer provided on a surface of the semiconductor substrate , the parallel pn layer including first-conductive-type semiconductor regions and second-conductive-type semiconductor regions that are arranged alternately;

a second-conductive-type base region provided on a surface layer of the second-conductive type semiconductor region;

a first-conductive-type source region provided on a surface layer of the second-conductive-type base region;

a gate electrode provided on a gate oxide film on a surface of the parallel pn layer; and

a source electrode that is electrically connected to the first-conductive-type source region and the second-conductive-type base region and that is provided away from the gate electrode, wherein the semiconductor device includes an insulating film selectively provided between the surface of the parallel pn layer and the gate electrode, the insulating film being thicker than the gate oxide film,

a first area where the gate electrode covers a neck part, of the surface of the parallel pn layer, other than the second-conductive-type base region or the first-conductive-type source region and a second area, of the first area, where the gate electrode covers the insulating film satisfy

$$0.1 \leq \text{second area/first area} \leq 0.4,$$

in a direction orthogonal to interfaces between the first-conductive-type semiconductor regions and the second-conductive-type semiconductor regions, a plurality of islands of the insulating film are provided on a surface of the neck part between adjacent ones of the first-conductive-type semiconductor regions, and

respective different ones of the insulating film are provided to cover a plurality of electric field concentration regions generated between adjacent ones of the first-conductive-type semiconductor regions.