

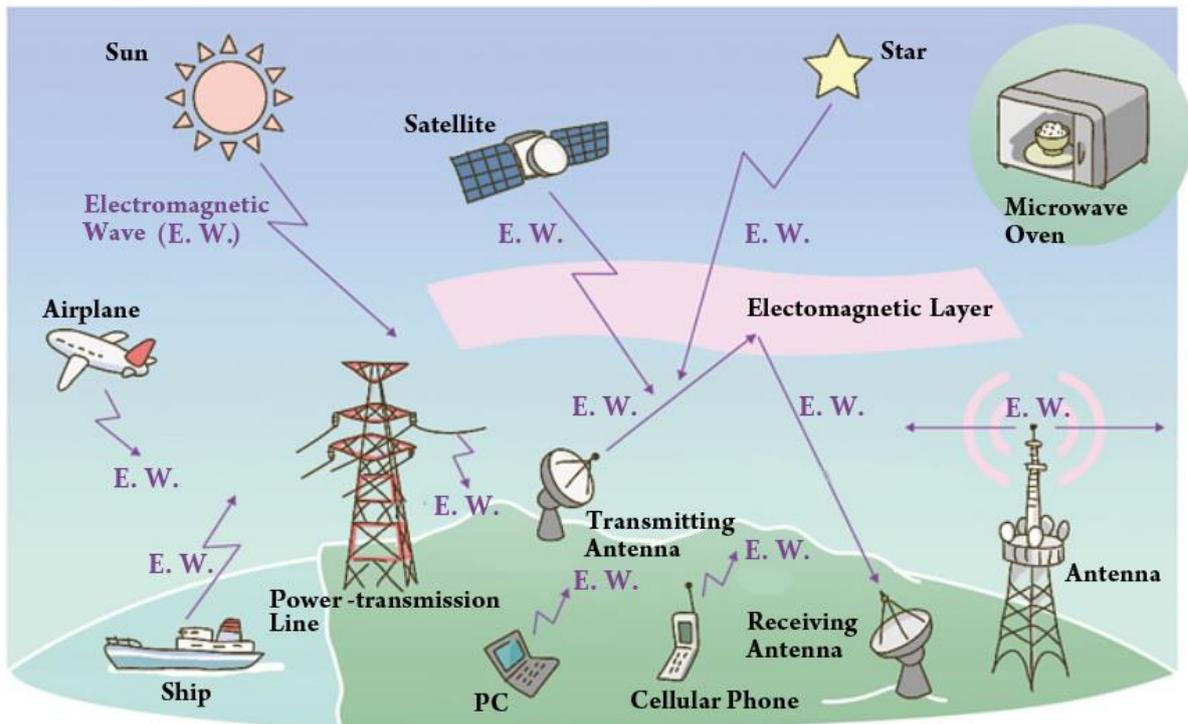
New coronavirus COVID-19 has hastened the arrival of the digital society !!

October 28, 2020

President, SHIMIZU Sumito

As Uchiya's sales strategy, I have appealed the importance of existence that a mechanic type of bimetal thermostat has played a role of not only a protector, but also a substitute for a temporary temperature controller in the event of the failure of an electronic control(semiconductor). I will explain the possible risks of semiconductors that are responsible for electronic control.

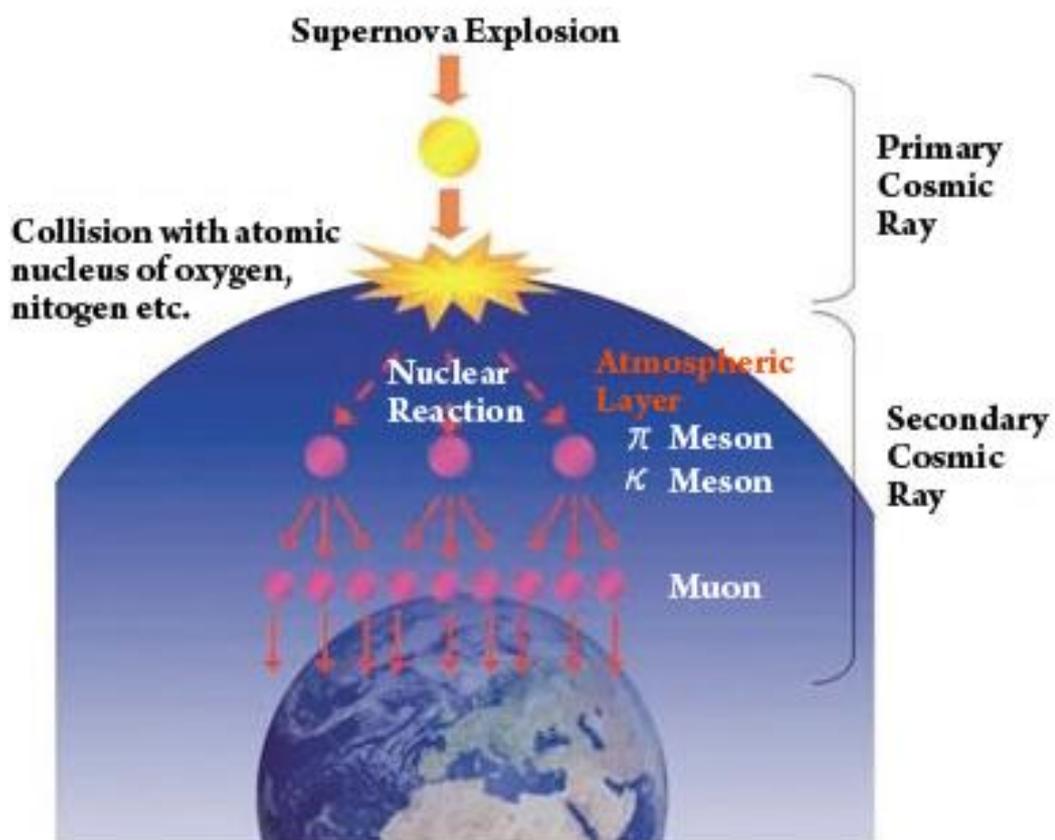
It is said that semiconductor products fail with a probability of several PPM or less, and a few pieces out of one million fail. It is very difficult to identify the failure cause of semiconductors. The reliability of semiconductor products depends on the external stress caused by electrical load, ambient environmental load, mechanical load, etc. on the product externally, and the tolerance of products themselves for these external stresses. To enhance reliability of products the two points should be needed. One is that products has more strength than anticipated external stresses. The other is that external stresses should be less than the strength of products when they are used. The causes which have influenced the reliability of semiconductor products in the external stresses for products are as follows. (1) Voltage, current, electric power and surge etc. as electrical load when in use. (2) Temperature, humidity, gas, dust, radiation and etc. as surrounding environment load. (3) Vibration and shock etc. in being assembled and transported as mechanical load. However, the extremely difficult global environmental problem in managing and controlling in the external stresses is thought to be the following factors which hinder electronic control.



① A cyber attack is destructive activities and theft & alteration of data, etc. for a computer system such as server, a personal computer, or a smartphone etc. through a network. It is done for targeting a specified organization, company and individual or attacking an unspecified large of people indiscriminately. The purposes are various. Sometimes some are committed for the purpose of money and many are committed just for the purpose of fun.

② Today's highly sophisticated information society is supported by many high-performance, multifunctional electronic devices created information and communication technology. If these devices malfunction, we have a risk of causing serious damage.

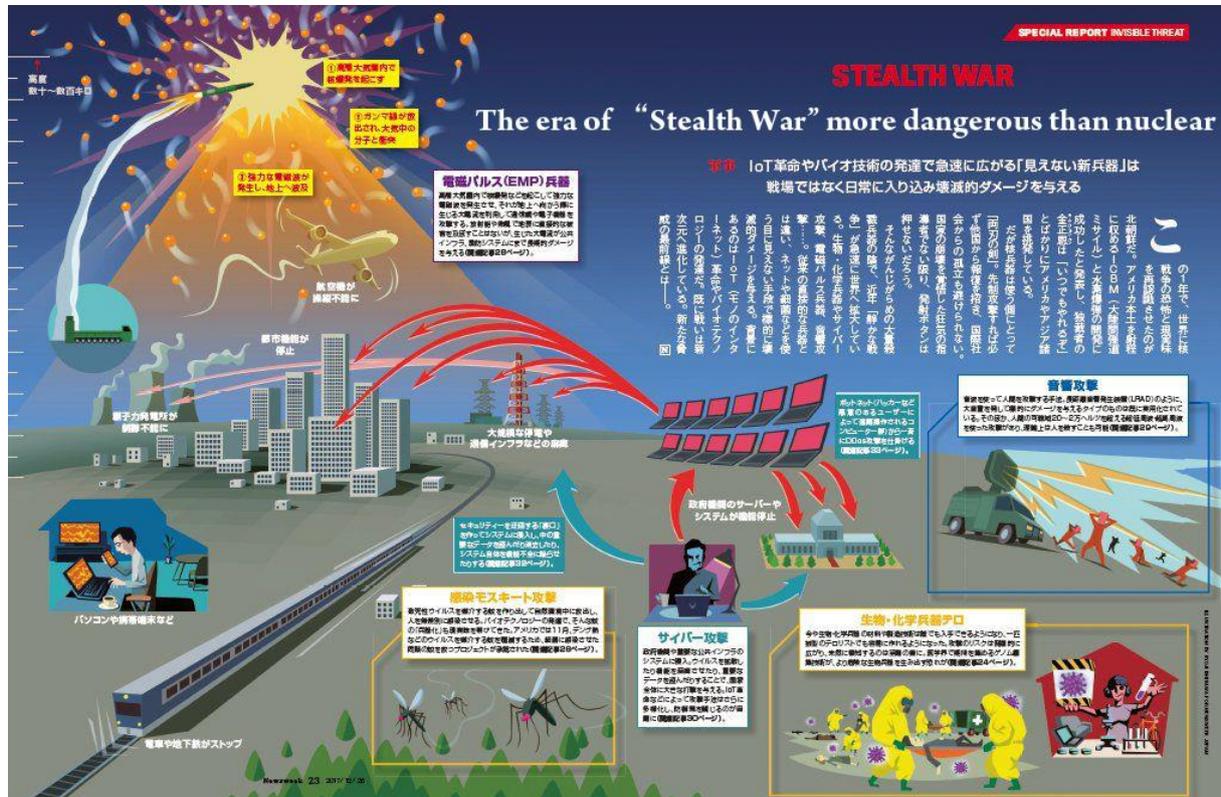
Therefore, in addition to improving the performance of equipment, it is important to ensure the reliability of them from the viewpoint of safety and security. One of the causes of malfunction of electronic devices, which has been attracting attention in recent years, is a phenomenon called soft error. A soft error is a transient malfunction or failure that is caused when an electronic device is exposed to radiation (cosmic rays). Cosmic rays are constantly falling on the ground, and the main component of the cosmic rays (about 75% of charged particles) is muons. Muons have high penetrating power, so they can reach inside electronic devices. As semiconductor devices become finer and energy consumption becomes lower, the radiation resistance of semiconductor devices is deteriorating. It starts to be pointed out there is a possibility that a soft error would be caused by not only cosmic ray neutrons, which have been a concern and whose countermeasures have been taken, but also by cosmic ray muons. With the spread of IoT, a huge number of semiconductor devices are used all over the world, so it is expected that the number of occurrences will increase in the future. In particular, once a malfunction occurs in an electronic device that supports social infrastructure, it can possibly cause a fatal disorder. Here is the significance of existence and opportunities of our bimetal thermostat and protector, which have a mechanic mechanism.



③ The solar storm in 1859 caused damages such as the shutdown of telegram systems throughout Europe and North America, and sparks from steel towers for telegraph. An electromagnetic pulse with high-energy induces a large current or voltage to the damaged devices, and temporarily interrupt or destroy their functions.

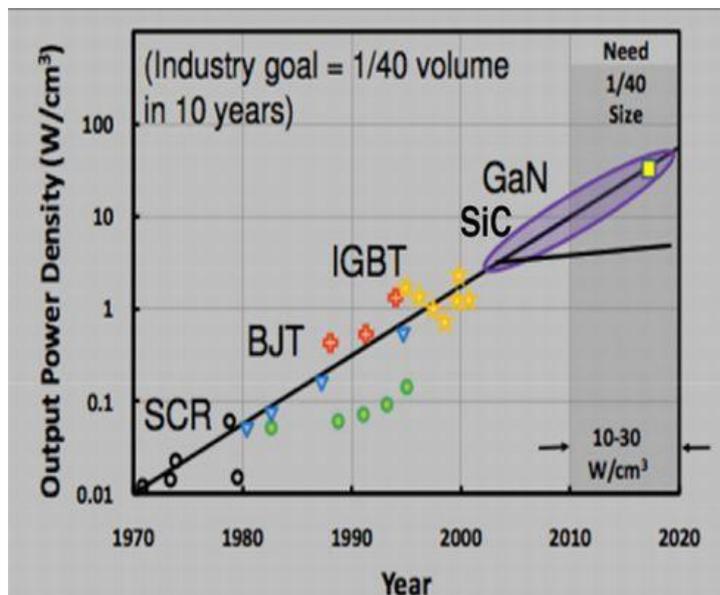
④ Very large electromagnetic pulses such as lightning strikes can also directly damage objects such as trees, buildings and aircrafts, either by the heating effect or by the destructive effect of very large

magnetic field generated by the electric current. In order to utilize the destructive power of high-energy electromagnetic pulses, electromagnetic pulse weapons with nuclear warheads, such as strategic missiles with a small effective range and strategic missiles with a maximum effective range, have been developed and manufactured. In addition, the great powers have assumed even a space war in which they would destroy artificial satellites (communication, broadcasting, GPS, etc.) that orbit the earth.



Next, power semiconductors are the semiconductors on which Uchiya's products are mounted the most. We need to recognize and respond accordingly that the wave of major technological innovation (GaN: gallium nitride) has been caused regarding these components.

Power semiconductors are semiconductors that mainly control and supply power supply (electric power), and it is characteristic of them that they handle large voltages and currents. Integrated circuits such as CPUs and memories are like brains that could be operated with small power, on the contrary, semiconductors are likened to muscles in the body that could handle widely from small



power to large power. There are "power transistors" and "thyristors" which make switching and non-"diodes" which don't make switching as a type of power semiconductors. In recent years, it has been questioned that in PFC circuits (power factor improvement) the loss caused by the diode of the rectifying bridge has worsened the efficiency improvement. However, it is almost impossible to remove the bridge diode in a Si (silicon) power device in which the reverse recovery time is long and a large amount of reverse recovery current flows. The reverse recovery time of GaN power devices is extremely short by 1/100 of that of Si, and a "bridgeless PFC" without the bridge diode has

been realized. There is a tough demand that power conversion efficiency should be improved, power density would be increased, and battery life should be longer in consumer apparatuses, telecommunication apparatuses and electric vehicles, as a result, switching speeds need to be faster. In the electronics industry Gallium nitride (GaN), except silicon (Si), has the ability to achieve performance which has never been done before. In wireless communication a high electron mobility transistor (HEMT) and a monolithic microwave integrated circuit (MMIC) have already been introduced as a high-power radio frequency (RF) device. By 2020, the GaN power component business is expected to reach a scale of approximately US \$ 600 million (¥ 61 billion) annually.

End

経営理念

経営目的： 「製品とサービスを通じて社会に安全を供給する。」

ウチヤは人々の安全を守り、社会に役立つ製品のメーカーとして、自然環境及び人類を含む生物多様性の保全に調和した企業活動を行いながら、従業員をはじめ、ウチヤに関わりを持つ全ての人達の安全、安心と安定的な幸福を得られるよう質の高い製品と情報を含むサービスを提供し続ける決意である。

環境品質方針

1. 製品の安全、消費者保護、公正な取引、環境保護、労働安全、人権保護などの各国関連法令規制及び国際安全規格要求事項を遵守するとともに、企業の社会的責任の下、社会の変化及び要求に適切に対応する。
2. ウチヤに関わる全ての人達の安全、安心と安定的な幸福を得られるよう、自然環境及び経営環境に配慮しながら商品の研究開発及びその設計、製造、購買、品質保証、営業活動などのプロセスの継続的改善を図り、全員一丸となって世界最高レベルの安定的な信頼性の高い製品とサービスを目指す。
3. 品質、環境、業務等の具体的な目的・目標を定め、計画を立て、確実に実行し、その進捗をレビューしながら、その目標達成に全組織をあげて全力で努力する。
4. 製品や製造工程にて有害な化学物質の使用を制限し、且つ資源・エネルギーの節約、リサイクル、廃棄物の減量化により CO2 に代表される自然環境負荷の軽減活動に積極的に取り組む。
5. ウチヤ及び構成する人々は、企業市民としての立場からも、その各地域を含めた自然環境及び生物多様性の保全に重大な関心を持ち、社内及びその各地域での自然環境保全活動に積極的に参画し、社会とのコミュニケーションを計り、その調和に努める。
6. この経営理念（経営目的）・環境品質方針は全従業員をはじめとして、ウチヤに関わりを持つ全ての人達の幸福と平安を願って、周知徹底するとともに、社内報やホームページなどを利用して外部へも広く公開する。

2019年12月12日 改訂

ウチヤ・サーモスタット株式会社

代表取締役社長 清水澄人



ウチヤ・サーモスタット (株)