

Technology Topics:
Special Feature
From smartphones to the IoT



Smart cities



Industry



Health and medical

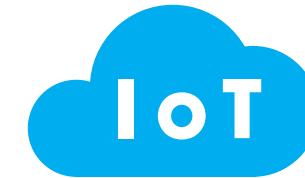


Transportation and automobiles



Food and farming

The Internet of Things



ULVAC Group is the global leader supporting the technology required for smartphones today and will contribute in vacuum technology for the spreading IoT world.

Smartphones has become more advanced with the increasing demand.

Vacuum technology is essential for such state-of-the-art technology advancements and for ULVAC, as the world's only global comprehensive vacuum equipment manufacturer, it is a challenge to create new value.

Smartphones is only the beginning and the quickly expanding IoT society will connect many more Things to the internet. More information will direct to increase cloud servers demand, higher performance, and energy saving technologies. Each individual Things connected will have independent sensors, communication mechanism, and batteries.

ULVAC' equipments will continue to contribute in production and advancements of key devices essential to the IoT society such as non-volatile memory, MEMS sensor, communication modules, thin film battery and many more.

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IoT

**Deep relationship with
ULVAC's vacuum technology.**

The IoT (internet of things) is expected to be a step towards solving social problems and generate innovation.

Information and communication through computers and smartphones will advance to everything and anything with the capability to be connected to the internet and/or communicate to each other, independently having sensor and communication capability to allow automatic sensing, automatic control, and remote measurements.

Things, people, places, and the environment all connected to each will change the everyday life and our business activity.

The IoT is expected to help many challenges facing within the Health, medical, transportation, agriculture, and many other industries and also generate innovation. To realize such society, technology advancement in the field of smaller and low power sensor, diversification of network, and the cloud is essential.

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Behind the scene: Evolution of *smartphones* with ULVAC's vacuum technology

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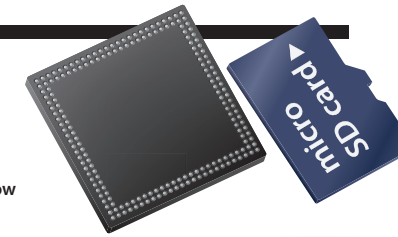
Vacuum technology is essential for such state-of-the-art technology advancements and for ULVAC, as the world's only global comprehensive vacuum equipment manufacturer, it is a challenge to create new value.

What is ULVAC's vacuum technology contribution to the state-of-the-art smartphone advancements?



Semiconductor integrated circuits

High-density packaging, flash memory, mobile DRAM, and low power consumption CPU



Many semiconductor integrated circuits is used within the smartphone such as CPU, acting as the controlling brain, flash memory to store important data and photo, DRAM, and etc. High level technology is required to realize small space, high integration, and power saving.

ULVAC contributes to the advancement of technology by supplying vacuum equipments and target materials to semiconductor production lines.



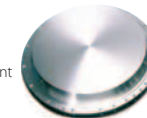
Sputtering equipment
ENTRON Series



Sputtering equipment
SIV Series



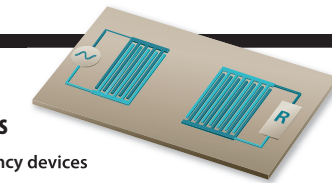
Natural oxide film
removal equipment
RISE Series



Sputtering
Target materials

High-speed communication modules

SAW devices and high-frequency devices



Smartphones have many wireless communication capabilities such as phone communication, internet connection, etc. To realize each wireless function high-frequency technology is essential. High frequency devices are sometimes installed individually, while some types are an integrated module. Electromagnetic shielding technology is utilized to minimize electromagnetic interference of each devices caused by the integration.

ULVAC contributes to the advancement of technology such as higher performance devices, high density modules, by supplying vacuum deposition equipments to the device manufacturing line and electromagnetic shielding process.



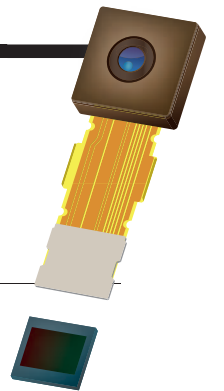
Sputtering equipment for
electromagnetic shielding
SDH Series



Etching equipment
NE Series

Sensors

Image sensors and gyro sensors etc.



Sensors within smartphones act as a key device and will be ever more important for the IoT society. Already the number of quantity of sensors has increased with variety of functions. Image sensors for cameras, gyro sensors to detect motion, are just few examples.

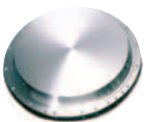
ULVAC contributes to the advancement of technology such as smaller size and high performance sensor production by supplying vacuum deposition equipments, dry etching equipments, and target materials.



Sputtering equipment
SME Series



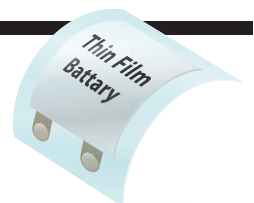
Etching equipment
NE Series



Sputtering
Target materials

Batteries

Thin film lithium secondary battery



Thin, flexible and safe with no leakage, these batteries also have a long life and are already used in RFID tags and smart cards etc. In the future, they are expected to be adopted for wearable technology and smartphones.

ULVAC contributes through film deposition equipment for mass production and target materials etc.

Inductive sputtering equipment
SIV Series



Evaporation equipment
EIH Series



High-definition displays

Liquid crystal, organic EL, touch panel, and flexible displays

LTPS (low temperature polysilicon), which is utilized in high quality liquid crystal displays and organic EL displays, is used for smartphone displays. It is essential for higher definition images and smooth video playback. In addition, touch panel displays has become the interface as much of use in everyday life.

Panel manufacturers require state-of-the-art vacuum equipments to produce high definition display which ULVAC role is to provide such deposition equipments and target materials used during the coating process.



Sputtering equipment
SMD Series



Organic EL display
manufacturing
equipment
ZELDA Series



Touch panel display
manufacturing equipment
STD Series



Sputtering target materials
IGZO