

◆ Function of electrical and electronic components

	Functions and properties required for EEE
1	Optical function
2	High speed communication and transmission function
3	Piezoelectric function (Conversion/Inversion between the mechanical power and electrical voltage) □ Refer to separate sheet "3. Piezoelectric function" for functional explanation.
4	Sliding function in mechanical section □ Refer to separate sheet "4. Sliding function" for functional explanation.
5	Display function(Liquid crystal display / LCD)

6	Safety and safety functions
7	Functional surface
8	Semiconductor
9	Thin-film device manufacturing process
10	Energy supply (Battery)
11	Cooling function (Refrigerant)

onic equipment (EEE) and performance requir

Characteristic of parts and materials to achieve their functions and properties of EEE
No interference of light transmission (Transparency)
Low transmission loss at high frequencies and wide frequency range
Piezoelectricity (pressure-sensitive detection) and good workability and durability
Lubricity and abrasion resistance, Elasticity, Low water absorption, Low moisture permeability
Low voltage drive and fast response (Low anisotropic refractive index and low viscosity)

Electrical insulation and flame retardancy, Chemical resistance, Heat resistance, Durability, Dripping prevention

Releasability and Heat resistance, UV protection, Antifouling, Waterproof

Photoacid Generators (PAG) , Surfactants, anisotropic/isotropic etching and protective layer formation, low dielectric constants, high thermostability, chemical inertness (to acids, bases, and solvents), and low moisture absorption, low electric permittivity /dielectric loss, low water absorption, and low coefficient of thermal expansion(CTE), In heat transfer fluid uses, electrically non-conductive, and usability in very broad temperature range, and non-corrosive in closed-loop systems

**Semiconductor manufacturing process and similar microfabrication process
Refer to item 8. Semiconductor**

Refer to Energy section

Refer to Fluorinated gases section

Requirement to PFAS material

Performance requirements for materials (PFAS)
Low refractive index, High transmissivity + Water and oil repellency, Flexibility, Flame retardancy
Low dielectric constant and Low transmission loss + Water and oil repellency, Flame retardancy
High Piezoelectricity (High piezoelectric coefficient) + Heat resistance, Flexibility
Lubricity, Abrasion resistance, Machineability + Flame retardancy, Durability, Low water absorption, Low moisture permeability
Low anisotropic refractive index, Low viscosity, Low voltage drive + Heat resistance, Durability

**Low dielectric constant, Flame retardancy, Machineability, Chemical resistance
+
Heat resistance, Durability**

Water and oil repellency, Heat resistance, Weather resistance

Photoacid Generators (PAG) , Surfactants, anisotropic/isotropic etching and protective layer formation, low dielectric constants, high thermostability, chemical inertness (to acids, bases, and solvents), and low moisture absorption, low electric permittivity /dielectric loss, low water absorption, and low coefficient of thermal expansion(CTE), In heat transfer fluid uses, electrically non-conductive, and usability in very broad temperature range, and non-corrosive in closed-loop systems

Refer to item 8. Semiconductor

(e.g.) Specific parts or components that accomplish the functions or characteristic of EEE

Optical fiber, Optical Lens, LED, Monitor/Panel, Fiberglass, Optical adhesive, Protective coating material, Anti-reflective material, etc.

Printed circuit boards (Smartphone, PC, Base stations, etc.), Antenna, Cable for High-frequency, Protective coating material, etc.

Speaker, Touch panel, Sensor, Actuator, etc.

Sliding parts in mechanical section (Bearing, Gear, Roll), Seal material (Packing, O-ring, etc.), Grease, Lubricant, Protective coating material, Epilame, Sealing material, etc.

Liquid crystal panel (TV, various monitor), etc.

**Cable, Pipe/Tube, Package, Seal material, Enclosure,
Protective coating material, Sealing material, Protection tube,
etc.**

Releasing and Protective coating material, Film, etc.

**Photolithography and thin films formed thereby, dry etching,
cleaning, heat transfer fluids, resins, manufacturing equipment
materials**

**Thin-film device such as MEMS(Sensor, Gyroscope, Inkjet
head), SAW filter, Angular velocity sensor, moisture sensitive
membrane, etc.**

Battery

Refrigerant

(e.g.) Typical EEE

Camera, Lighting, Monitor/Panel, Optical cable, Smartphone, etc.

Other products in RoHS categories 1- 11 would need this function if they use optical function in control panels for example.

Smartphone, PC, Antenna, Base stations, etc.

Other products in RoHS categories 1- 11 would need this function if they use communication function to operate or update it for example.

Touch panel, Speaker, Various sensor, etc.

Other products in RoHS categories 1- 11 would need this function if they use touch panels or sounds for example.

Motor, Printer, Industrial equipment, Camera, Display, etc.

All the EEE in RoHS categories 1- 11 would need this function.

Liquid crystal display panel (TV, Monitor for various device), etc.

Other products in RoHS categories 1- 11 would need this function if they use control panels or monitors for example.

Cable, Monitor, Medical equipment, Electric appliance, Industrial control equipment, Printer, etc.

All the EEE in categories 1- 11 would need this function.

Cooking appliance, Touch panel, Smartphone, Printer, etc.

All the EEE in RoHS categories 1- 11 would this function.

All the EEE in RoHS categories 1- 11 would use semiconductors.

Car navigation system, Sphygmomanometer (blood pressure meters), Inkjet printer, Smartphone, etc.

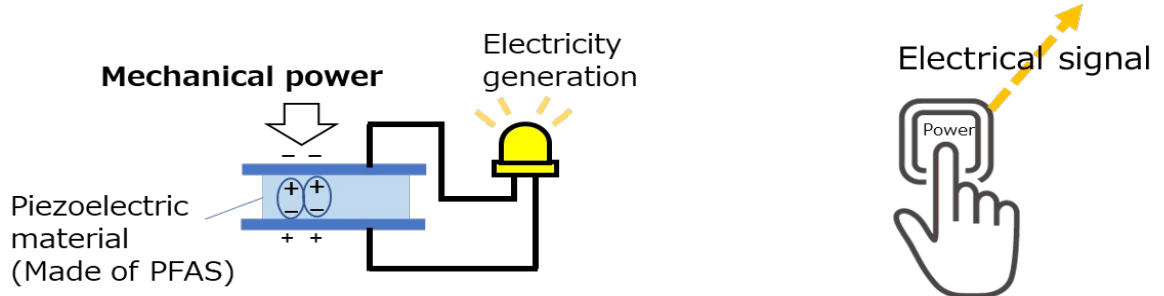
Other products in RoHS categories 1- 11 may use thin-film device.

All the EEE in RoHS categories 1- 11 would use batteries.

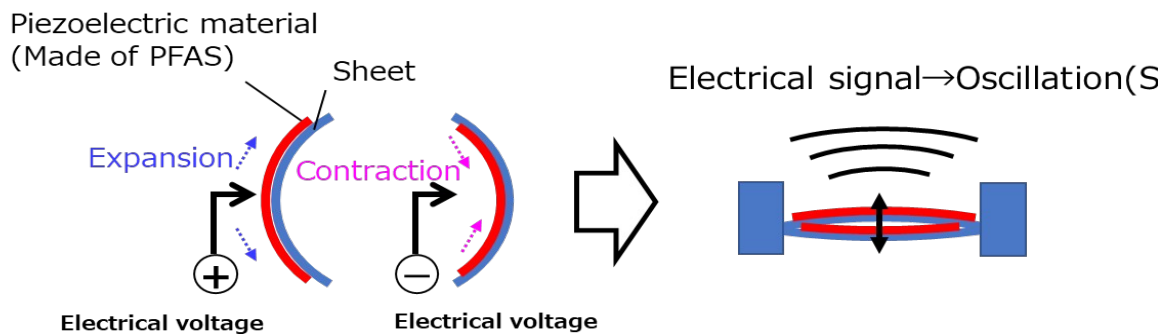
All the EEE in RoHS categories 1- 11 would use refrigerant

3. Piezoelectric function

1) Piezoelectric effect: Convert mechanical power into electricity



2) Inverse piezoelectric effect: Convert electrical voltage into power (Expansion and Contraction)



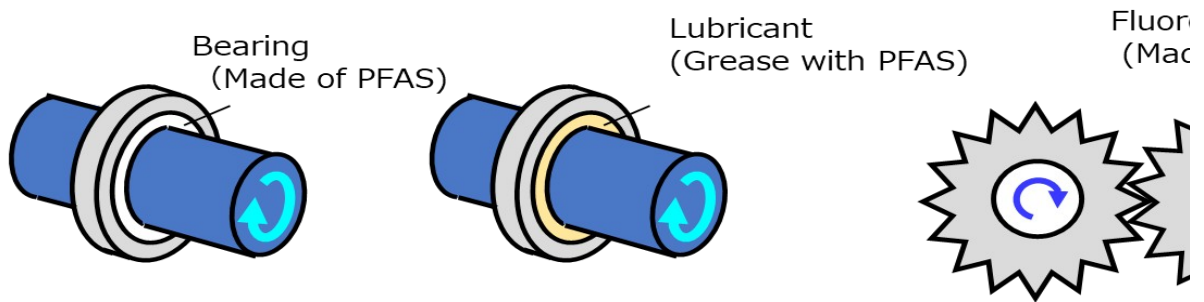
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mechanical

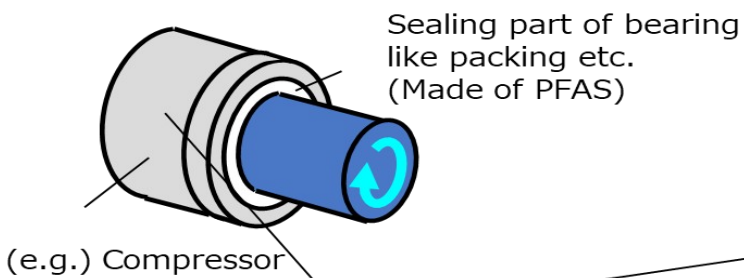
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4. Sliding function

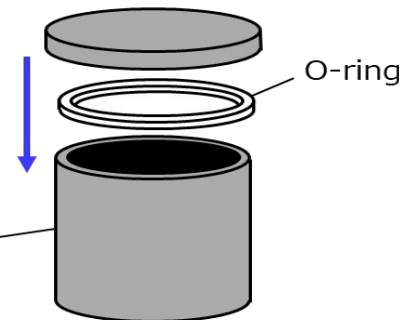
1) Lubrication improvement (Sliding part)



2) Seal improvement (Sliding part)

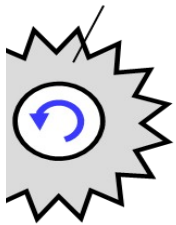


3) Seal improvement



Fluoropolymers, which have excellent sealing properties, are sometimes used for containers.

opolymer gear
de of PFAS)



ent (Fixed part)

|(Made of PFAS)