# Canāree iX6 Vape Detector with Noise Metering

*Configurable Indoor Air Quality Monitor complete with Vape/Smoke Detection*
*Product Specification*

## Product Summary

Canāree iX series products are AI-based intelligent Indoor Environment Monitors (IEM) that detect various gases and particulate aerosols in real-time, capable of identifying sources of pollution as well as providing feedback on mitigation steps to clean the air, reduce health risks, and other environmental factors that affect inhabitants.

There are two different types of X models – a ceiling mounting type iX, and a wall mounting hub called Canāree iXD. Multiple iX devices can be configured to communicate with an iXD unit via WIFI or PoE. iXD unit has a touch screen display to monitor real-time data from every iX-device connected, and from the device itself. All models can operate as stand-alone device and can be IoT enabled when connected to a networked device such as Wireless Access Points or any Windows PC / Mac running Piera's SenseiAQ Software.

Piera Systems' advanced particle counter – IPS7100, Volatile Organic Compounds (VOC), temperature, relative humidity, pressure, and sound sensors are offered as standard in the base models for Canāree iX and iXD. The base models can be customized to include additional sensors such as ammonia, CO, NDIR-based $CO_2$ $NO_2$, $SO_2$, $O_2$, $O_3$, and vibration detectors. Please refer to the product lineup section for more details.

**Canāree iX6**

All Canāree iX series models collect real-time air quality data locally and send that data to a Piera SenseiAQ cloud for remote monitoring and analysis. SenseiAQ™ software displays the data on a dashboard (or on iXD screen itself) including Air-Quality-Index (AQI) scores, color-coded for EPA Standards along with vape/smoke/AQ alerts. APIs are available to support third party integrations such as Air Quality Management Systems (AQMS), Building Management Systems (BMS) and IoT Device Management.

## Features

- AI/ML based compact indoor environment monitoring
- Industry leading advance particulate sensor IPS-7100 (2nd gen)
- Customizable various environment sensors*
- Supports wireless/wired network
- OTA firmware update capability
- Built-in VSD (Vape/Smoke Detection) module
- Intelligent health risk analysis
- High accuracy and reliability
- 7 in full color touch screen display*
- LED air quality status indicator*
- Modular sensor replacement for IPS-7100

\* Features may be only available for specific models.

## Applications

- Indoor air quality / environment monitoring & management systems
- Hospitals, office spaces, college campuses, hotel/shared living and industrial environments
- Smart fire detection
- Vape/smoke/wildfire smoke detection with real-time alerts and notifications
- Cannabis detection
- Air quality mitigation (air purifiers, HVAC systems)
- Smart buildings and Building Management Systems (BMS)
- Health risk assessment, hazardous gas detection

# 1. Sensor Specifications

## 1.1. Hardware

| Features | Specifications | |
|---|---|---|
| | Canāree iX | Canāree iXD |
| Power consumption | 0.8A | 1.2A |
| Physical dimensions | 5 in diameter, 1.5 in height | 4 in x 7.5 in x 2 in |
| Weight | 200g | 400g |
| Software supported | SenseiAQ (Windows / MacOS) Application | |
| Cloud reporting support | Microsoft Azure IoT Hub, BMS Web Polling | |
| Storage temperature range | -40°C to +80°C | |

Table 1. Canāree hardware specifications

## 1.2. Embedded Sensors

| | Parameter | Conditions | Value | Units |
|---|---|---|---|---|
| Particle Sensor | Particle Count (PC) Resolution | - | 1 | #/L |
| | Mass Concentration (PM) Resolution | - | 0.1 | ug/m$^3$ |
| | Effective Particle Count Concentration (PC) Range [1] | - | <100,000,000 | #/L |
| | Particle Count (PC) Precision [2] (≤PC2.5) | 0 – 100,000 #/L | ±10,000 | #/L Ave. |
| | | > 100,000 #/L | ±10 | % Ave. |
| | Particle Count (PC) Precision [2] (>PC2.5) | 0 – 200,000 #/L | ±20,000 | #/L Ave. |
| | | > 200,000 #/L | ±10 | % Ave. |
| | Effective Mass Concentration (PM) Range [1] | - | <6,000 | ug/m$^3$ |
| | Mass Concentration (PM) Precision [2] (≤PM2.5) | 0 – 10 ug/m$^3$ | ±1 | ug/m$^3$ Ave. |
| | | >10 ug/m$^3$ | ±10 | % Ave. |
| | Mass Concentration (PM) Precision [2] (>PM2.5) | 0 – 50 ug/m$^3$ | ±5 | ug/m$^3$ Ave. |
| | | >50 ug/m$^3$ | ±10 | % Ave. |
| | Particle Size Bin Allocation (PC: differential, PM cumulative) | PC0.1 [3] | 0.05 to < 0.1 | um |
| | | PC0.3 | 0.1 to < 0.3 | um |
| | | PC0.5 | 0.3 to < 0.5 | um |
| | | PC1.0 | 0.5 to < 1.0 | um |
| | | PC2.5 | 1.0 to < 2.5 | um |
| | | PC5.0 | 2.5 to < 5.0 | um |
| | | PC10 | 5.0 to < 10 | um |

| | | | | |
|---|---|---|---|---|
| | Start-up Time [4] | Default: 5 (until stable output) | >2.5 | s |
| | Count Sampling Time | Default: 0.2 | ≥0.1 | s |
| | Data Output Interval | Default: 1 (0.2 in debug mode) | ≥0.1 | s |
| | Recommended replacement cycle [5] | Continuous operation | 1 | Yr. |
| | Air flow rate | Standard atmosphere | 0.13 | LPM |
| | Laser Wavelength | Typical | 658 | nm |
| | Laser Diode Power Consumption [6] | Typical | 3.5 | mW |
| | Coverage area | 3m height | 30 | $m^2$ |
| | Operating range | -10 to +60°C, 0 to 95% RH | | |
| Gas Sensors | VOC (Formaldehyde, Toluene, Benzene, Hydrogen, Organic solvent, xylene) precision | - | ±7 | % |
| | CO operation range | - | 1 – 1,000 | ppm |
| | $CO_2$ operation range | - | <10,000 | ppm |
| | $CO_2$ accuracy | - | ±50+5% m.v | ppm |
| | $NO_2$ operation range | - | 0.05 – 10 | ppm |
| | $SO_2$ operation range | - | 0 – 20 | ppm |
| | $NH_3$ operation range | - | 1 – 500 | ppm |
| | $O_2$ | - | 0 – 30 | % |
| | $O_3$ | - | 0 – 5 | ppm |
| Temp, RH, Pressure, Sound | Response time | $_T$0-63% | 8 | s |
| | Accuracy tolerance | <80% RH | ±1.5 | % |
| | Hysteresis | @ 25 °C | ±0.8 | % |
| | RMS noise | - | 0.12 | Pa |
| | Sensitivity error | - | ±0.1 | % |
| | Temperature coefficient offset | - | ±1.3 | Pa/K |
| | Temperature operation range | - | -40 – 105 | °C |
| | Sound level sensor | 30Hz – 8kHz | 35 – 120 ±2 | dB |

Table 2. Canāree iX series specifications

1. Device will report data with accuracy specified on this datasheet within the respective ranges. The precision is not guaranteed beyond the ranges.
2. Device-to-device variation based on average readings over multiple sampling concentration levels using 1.5% potassium chloride solution at 25 °C and 50%RH. Piera uses GRIMM 11D for individual device calibration. Different reference instruments may yield different data under various conditions.
3. Extrapolated data. Contact Piera Systems for further details.
4. Start-up time is 5 second by default. Any data output during this period should be discarded. Subject to change depending on the user settings for the count sampling time. The start-up time may be longer depending on the environment where device is being used in.
5. Lifetime may vary depending on different operating conditions.
6. Complies with the IEC60825-12 specification.

## 2. Ordering Information

Please visit www.pierasystems.com or email to info@pierasystems.com for availability.

Unit pricing and discounts have been submitted to RFX portal submission as per the Tender 19788.

## 3. Product Lineup

| Features & Options | IX | iXD |
|---|---|---|

| | | iX6 | iX7 | iX10 | iX13 | iXD10 | iXD13 |
|---|---|---|---|---|---|---|---|
| **Standard Sensors** | Particulate (0.1um – 10um) | o | o | o | o | o | o |
| | VOC | o | o | o | o | o | o |
| | Temperature | o | o | o | o | o | o |
| | Relative humidity | o | o | o | o | o | o |
| | Pressure | o | o | o | o | o | o |
| | $CO_2$ | | o | o | o | o | o |
| **Optional Sensors** | CO | | | o | o | o | o |
| | $NO_2$ | | | o | o | o | o |
| | $NH_3$ | | | o | o | o | o |
| | $SO_2$ | | | | o | | o |
| | O2 | | | | o | | o |
| | $O_3$ | | | | o | | o |
| | Sound level sensor | o | o | o | o | o | o |
| **Features** | 7 in. touch screen display | | | | | o | o |
| | Vape/Smoke detection | o | o | o | o | o | o |
| | Smart fire detection | o | o | o | o | o | o |
| | Marijuana detection | o | o | o | o | o | o |
| | Health risk assessment | o | o | o | o | o | o |
| | Hazardous gas alert | o | o | o | o | o | o |
| | AI/ML based pollution classification | o | o | o | o | o | o |
| | Aruba AP USB support | o | o | o | o | o | o |
| | Wired network | o | o | o | o | o | o |
| | Wireless ethernet | o | o | o | o | o | o |
| | Bluetooth | o | o | o | o | o | o |
| | PoE | o | o | o | o | o | o |
| | Static IP support | o | o | o | o | o | o |
| | BMS support | o | o | o | o | o | o |
| | LED indicator | o | o | o | o | | |
| | 802.11AF (PoE + 48V) | o | o | o | o | o | o |
| | Micro HDMI output | | | | | o | o |
| | SD Card local storage | o | o | o | o | o | o |
| | Battery backup | o | o | o | o | o | o |

Table 3. Canāree product lineup and features

# 4. Understanding the Health Impacts of Vaping

## Immediate and Long-Term Effects

The short-term and potential long-term health impacts of vaping are increasingly understood, and they pose significant concerns. The ingredients in e-liquid can cause immediate harm:

**Nicotine**: Addictive and overstimulates the sympathetic nervous system, leading to increased heart rate and blood pressure. Chronic overstimulation is a risk factor for cardiac failure.

**Solvents**: Propylene glycol and glycerin, though recognized as safe by the FDA, can irritate and inflame the airways. Short-term exposure can lead to coughing, sore throat, and decreased lung function. Long-term exposure is associated with wheezing and chest tightening.

## Hazardous Flavorings

Certain flavorings in vapes are particularly concerning:

**Buttery Compounds**: Diacetyl and acetyl propionyl are known industrial hazards.

**Other Flavors**: Candy floss, menthol, coffee, strawberry, chocolate, cinnamon, sweet tobacco, caramel, and vanilla can produce inflammatory responses.

**Sweeteners**: Sucrose and glucose, when heated, form reactive aldehydes, which are linked to heart and lung disease.

## Unintentional By-Products

Vaping also releases harmful byproducts:

**Heavy Metals**: Heating elements can release heavy metals like nickel and chromium. Prolonged exposure increases the risk of lung cancer.

**Tobacco Smoke Nasties**: Vaping aerosol contains substances like carbon monoxide, tobacco-specific nitrosamines, and volatile organic compounds (VOCs) such as formaldehyde and acrolein.

## Lung Health and Cancer Risk

Vaping may cause DNA damage, inflammation, and other biological responses that precede tumor formation. Studies have shown an increased incidence of lung and bladder cancer in animals exposed to vaping aerosols. However, long-term human effects are not fully understood.

## Vaping vs. Smoking

While vaping is not without risks, it poses significantly fewer hazards compared to smoking:

**Toxic Substance Levels**: Vapers exhibit lower levels of toxic substances compared to smokers.

**Health Risks**: The risk from second-hand vape exposure is minimal.

**Smoking Cessation**: Vaping is an effective tool for smoking cessation, with higher success rates than going cold turkey or using nicotine replacement therapy.

## Youth Vaping Concerns

Serious mental health issues have been proven because of nicotine exposure on youths. Nicotine can exacerbate anxiety and depression, which are already common issues during adolescence.

In addition, nicotine can have a cognitive impact. The effects of nicotine on the developing brain can lead to difficulties with concentration and memory.

Vaping poses significant health and behavioral risks to middle school and high school students. Comprehensive education, strong policies, and supportive resources are essential to protect young people from the dangers of vaping. This includes the use of vape detectors like the Canāree iX6.

## Safety Recommendations for Vaping

If one must vape, certain precautions can minimize risks:

**Heating Element**: Use elements that do not contain heavy metals. Stainless steel elements are safer.

**Flavors**: Avoid buttery and cinnamon flavors due to their hazardous compounds.

**Solvents**: Both propylene glycol and glycerin are common solvents, and their safety is relatively equal.

**Air**: Ensure proper ventilation to reduce concentration of harmful substances.

### Conclusion

While vaping is a less harmful alternative to smoking, it is not without its dangers. Continuous monitoring of its health impacts and regulatory measures to control the use of hazardous substances in e-liquids are essential.

## 5. Technical Summary

Inside every Piera Systems Canāree model iX6 is Piera's patented Intelligent Particulate Sensor (IPS) - a highly sensitive, photon-counting optoelectronic particulate sensor. Utilizing Piera's custom particle counting integrated circuit as a core processor, the IPS is compact and consumes low power while acquiring data rapidly, categorizing particulates based on their size. The IPS-7100 outputs seven bins, or channels, of particle sizes. The IPS features an adjustable sensitivity control that provides superior accuracy and versatility.
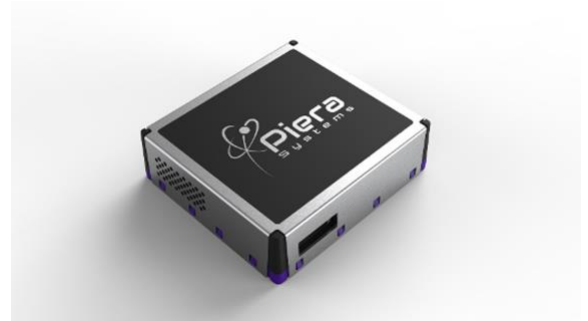
Using a unique algorithm to identify different particulates, the IPS is suitable for precise real-time airborne particulate matter monitoring, down to ISO class 7 cleanroom environment. Each Piera IPS is tested and calibrated in a controlled environment.

### Vape and Smoke Detection

With the IPS, data is collected on particle count and particle size across 7 channels. As a result, pollution profiling now becomes possible. Pollutants like vape, cigarette smoke or wildfire smoke present themselves like signatures (see Fig. 1).
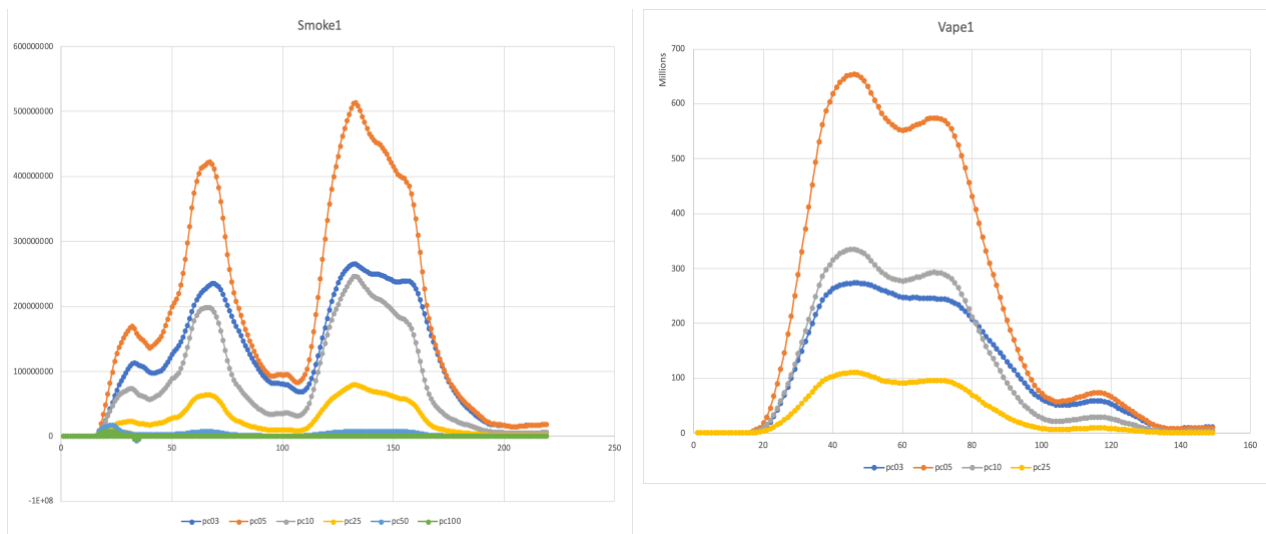


Fig. 1 – Vape and Smoke Time Series Signatures

To classify, or profile a particular pollutant, requires accurate particle count and size data from multiple bins or channels over time.

Scientists from many research organizations agree with Piera's belief that, by combining the IPS particle data together with data from other sensors like temperature, humidity, or volatile organic compounds (VOCs), multiple pollutants can be detected in a process called 'sensor fusion'. Such pollutants include mold, construction dust, diesel smoke, allergens and more.

### IPS Vape/Smoke Detection Specs

Detection Accuracy:     95-96%
Response Time (sec):              < 10
Coverage Area (sq. ft):              400-800    (assuming 8 ft ceilings)
Self-Test & Diagnostics: Yes
Self-Cleaning:              Yes
MTBF (years):              8    (assuming regular indoor/office/school use)

## 6. Connectivity and Monitoring

### POE or Wi-Fi

The Canāree iX Series supports both Wireless LAN (802.11n) or Wired Ethernet (with PoE+ support) for fully standalone operation with the ability to control external Internet-of-Things (IoT) devices like security cameras, relays, or interoperate with Building Management Systems (BMS) using standard HTTPs and JSON APIs.   Redundant Power can be provided by using both POE+ and USB for backup power, with failover from Wired to Wireless ethernet for transport.

### Piera Systems and HPE Aruba Networking

HPE Aruba Networking's secure and agile infrastructure is the ideal way to support Piera's Canāree sensors in applications of any size. Adding Piera System's future-proof air quality monitoring to your existing HPE Aruba Networking infrastructure can result in higher standardized test scores, reduce the spread of respiratory illness, decrease absences while saving energy and improved student health by lowering vape/nicotine addiction rates.

Plug and Play USB installation allows the Canāree to be deployed anywhere an HPE Aruba Networking AP is installed or planned in an ideal ceiling mounted location without additional expensive conduit or installation costs. Power and secure IoT communications are provided by the HPE Aruba Networking APs. Piera Systems Canāree Air Quality Monitoring solutions can be quickly, securely and cost effectively deployed using HPE Aruba Networking Access Points.

Leverage existing HPE Aruba Networking access points for Piera System's air quality monitoring and vape/smoke detection helps customers to reduce costs, simplify installation and deliver real-time analytics to quickly and cost-effectively monitor indoor air quality and screen for vaping or cigarette smoke.

### SenseiAQ Air Quality Monitoring-as-a-Service

All Canāree models collect real-time air quality data locally and send it to the cloud for remote monitoring, alerting and analysis. SenseiAQ software displays the data on a dashboard monitoring multiple devices including Air-Quality-Index (AQI) scores, color-coded for EPA Standards along with vape/smoke/AQ alerts. APIs are available to support third party integrations such as Air Quality Management Systems (AQMS), Building Management Systems (BMS) and IoT Device Management (Fig. 2).



| Air Quality Monitors & Vape Detectors deployed | Air quality data aggregated in the cloud | SenseiAQ software and services provide alerts, insights, mitigation | AI/ML pollutant models identify likely pollutants |
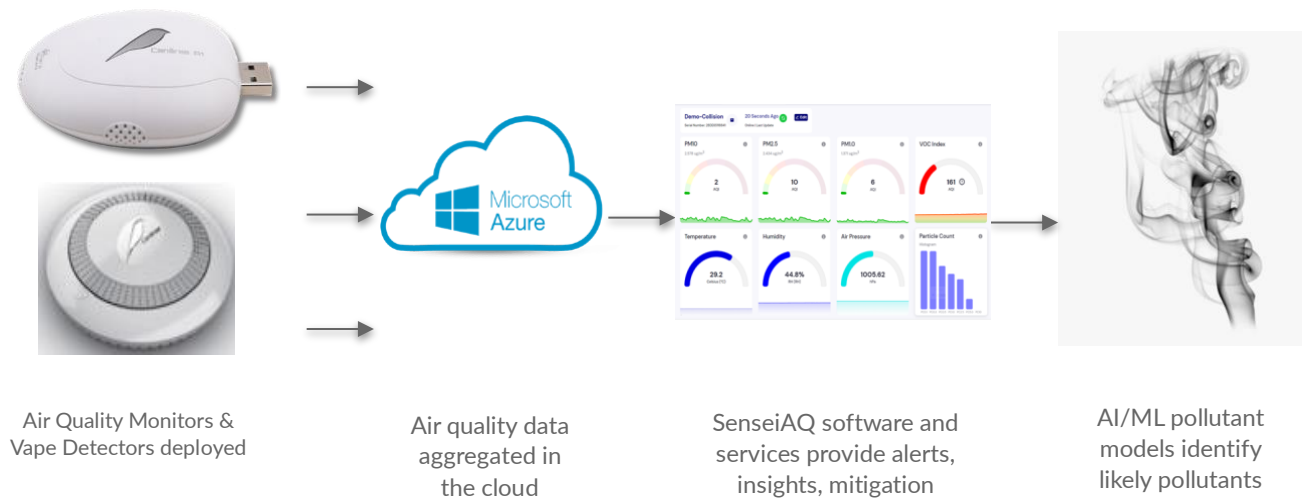
Fig. 2 – Canāree Ecosystem

SenseiAQ software is included with all Canāree monitors and detectors at no additional cost, including 90 days of Air Quality Monitoring Service (AQMS). Alerting is enabled for SMS texts and emails. These alerts include the detection of a pollutant like vape or smoke, but also power outages and offline due to WIFI connectivity issues.   Extended warranty beyond the first year is available with the purchase of a maintenance contract.

## 7. Accessories

### Wired Cages



Corner mount, steel wire cage (7.75" x 5.37" x 5.62").

$ 89.95



Wall mount, 9-gauge steel wire cage (7.4" x 6.15" x 3.39").

$ 99.95

### Signage

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AODA-compliant "No Vaping – Smart Sensors Installed" signage for schools (6" x 9").

$ 49.95

## POE Injectors



POE Injector Adapter, 30W, 10/100/1Gbps. Up to 390 ft (120m)

$ 49.95

## Power Supply



POE Injector Adapter, 30W, 10/100/1Gbps. Up to 390 ft (120m)

$ 49.95

# 8. Notes

## 8.1. Warning, Personal Injury

**Do not use this product as safety or emergency stop devices or in any other application where failure of the product could result in personal injury. Do not use this product for applications other than its intended and authorized use. Before installing, handling, using or servicing this product, please consult the datasheet and application notes. Failure to comply with these instructions could result in death or serious injury**.

If the Buyer shall purchase or use IPS for any unintended or unauthorized application, Buyer shall defend, indemnify and hold harmless Piera and its officers, employees, subsidiaries, affiliates and distributors against all claims, costs, damages and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if Piera shall be allegedly negligent with respect to the design or the manufacture of the product.

## 8.2. ESD Precautions

The inherent design of this component causes it to be sensitive to electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation, take customary and statutory ESD precautions when handling this product.

## 8.3. Warranty

Piera warrants solely to the original purchaser of this product for a period of 12 months (one year) from the date of delivery that this product shall be of the quality, material and workmanship defined in Piera's published specifications of the product. Within such period, if proven to be defective, Piera shall repair and/or replace the product, in Piera's discretion, free of charge to the Buyer, provided that:

- notice in writing describing the defects shall be given to Piera within 14 (fourteen) days after their appearance;
- such defects shall be found, to Piera's reasonable satisfaction, to have arisen from Piera's faulty design, material, or workmanship;
- the defective product shall be returned to Piera at the Buyer's expense; and
- the warranty period for any repaired or replaced product shall be limited to the unexpired portion of the original period.

This warranty does not apply to any equipment which has not been installed and used within the specifications recommended by Piera for the intended and proper use of the equipment.

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Piera reserves the right, without further notice, (i) to change the product specifications and/or the information in this document and (ii) to improve reliability, functions and design of this product.