



IATF 16949



ISO 14001:2004



SQ Certification



SES-Tier2 Certification

# SANGSHIN ELECOM

Temperature Sensor | Humidity Sensor | Potentiometer  
Dust Sensor | Ionizer



## Company Vision

To be recognized for excellence  
in innovation & technology

## Brief History

1973	Korea Sangshin Electric Co., Ltd. founded
1982	LC filter & Delay Line developed
1990	R&D Center & Ceramic Production facility opened
1991	Dielectric Resonator filter developed
1992	VCO for Wireless Communication developed
2000	PLL developed GPS patch and chip antenna developed
2001	Shanghai Factory opened GPS Module developed
2002	Humidity Sensor developed
2003	Company name change from KSE to Sangshin Elecom
2005	ISO9001, ISO14001 certification acquired
2007	SQ Certification awarded by HKMC
2009	Metal Antenna/PCB Antenna developed
2010	C/R(Fuel Level Card) developed for HKMC
2012	Bluetooth Module developed
2014	GNSS Module developed
2015	Dust Sensor developed
2016	Ionizer developed Multiband antenna for autonomous driving
2017	Vietnam factory opened
2018	IATF 16949:2016 certification acquired

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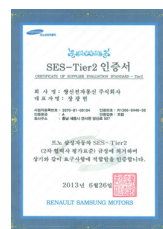
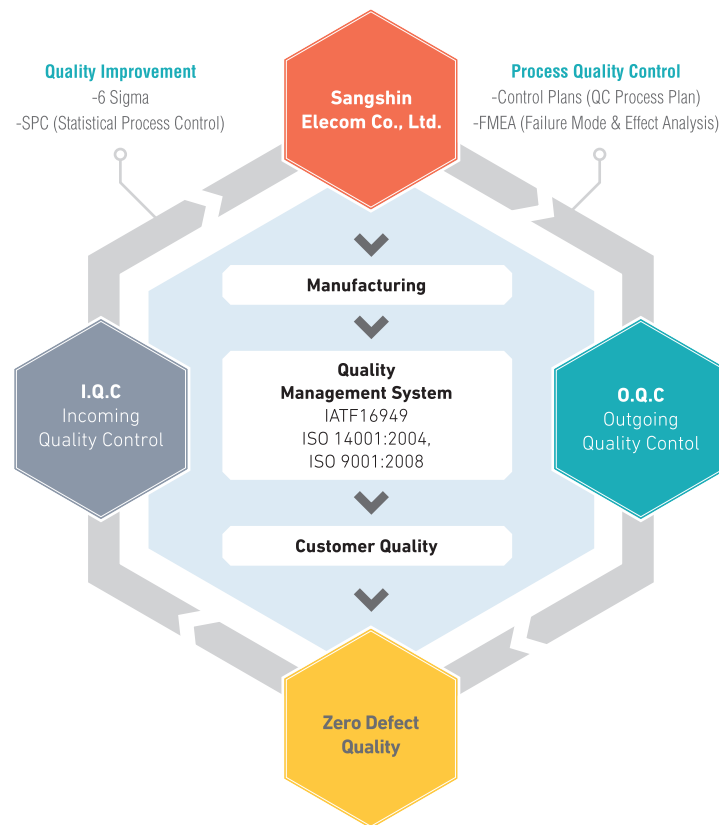
# Quality Management - Quality System

Sangshin Elecom is a leading manufacturer of high quality and accuracy sensor solutions for automotive and consumer business. We realize the customer satisfaction by continuous new product developments based on accumulated techniques, experience, and creative concepts.

The quality management is certainly established to grow into a top global company, and for this, all executives and staffers take active part in its successful implementation.

In order to ensure the quality and price competitiveness, we continue to expand our production facilities and establish the business superiority system.

## The Leader for Superior Quality



# Core Value - Environmental Policy

Sangshin Elecom goes upon the global market and professes the strong intent of challenge, enterprising attitude and the passion that can make the impossibility possible.

As an innovative leader creating growth power, we go over the present IT techniques and create tomorrow's technology. We are doing the best to provide the value and listen closely to the customers.

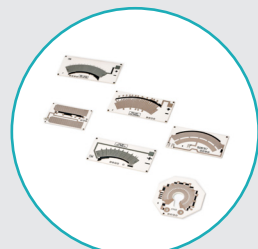
We have been actively practicing the environmental policy since 2003 and do comply with the related regulations as well as customer requirements and continuously expand green workshops which eventually contributes to customers.

## Environmental Management System

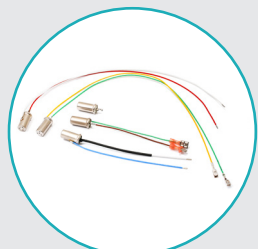


# Sensors Overview

Automotive



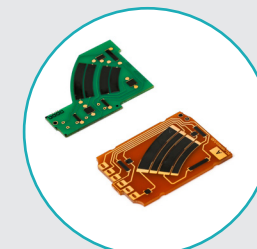
Ceramic Resistor Card



Fuel Warning Sensor



In Car Sensor



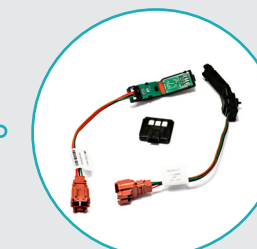
Acceleration Pedal Position Sensor (APS)



Dust Sensor, Ionizer



Continuous Wear Sensor (CWS)



Auto Defogging Sensor



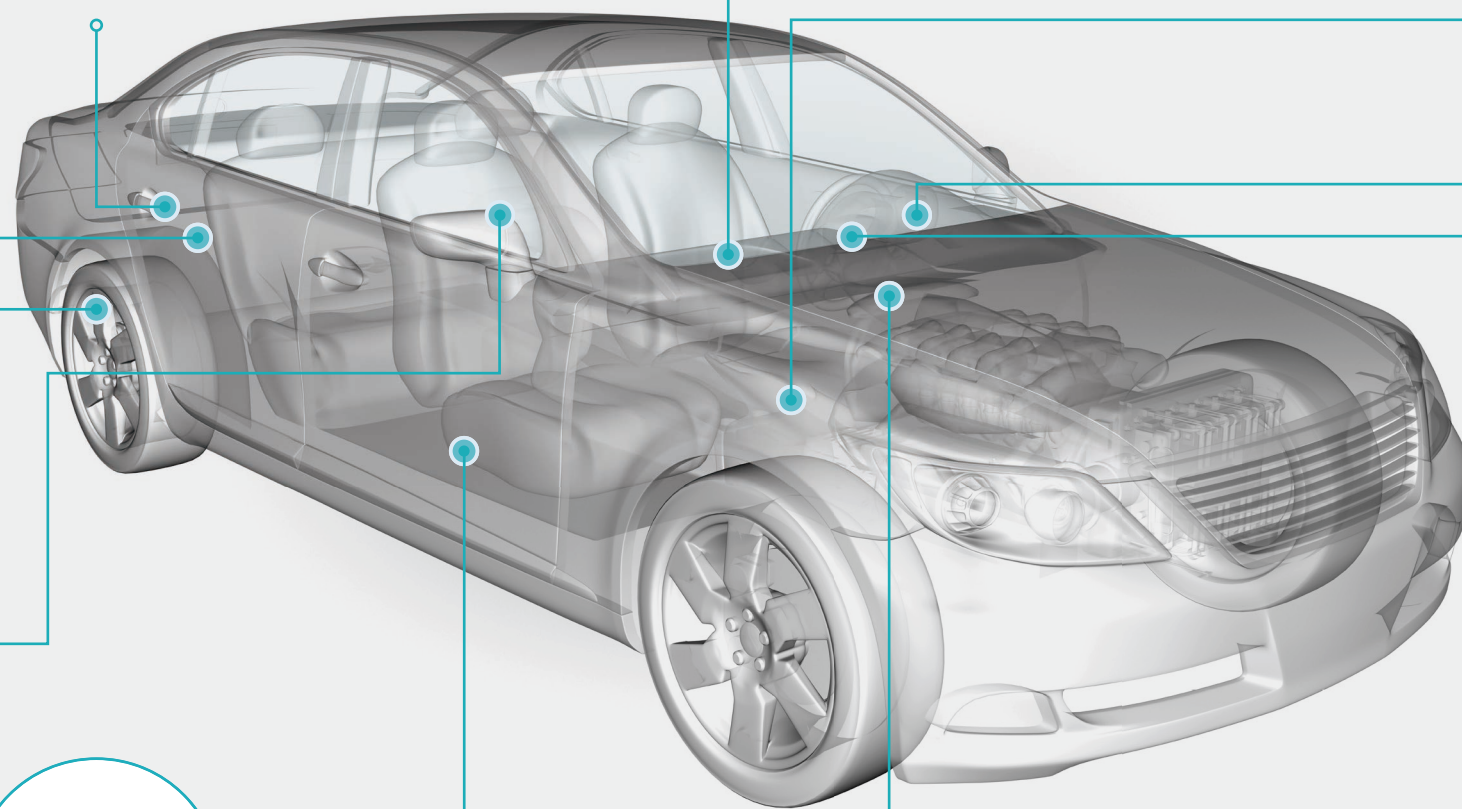
Ambient Sensor



Battery pack Temperature Sensor

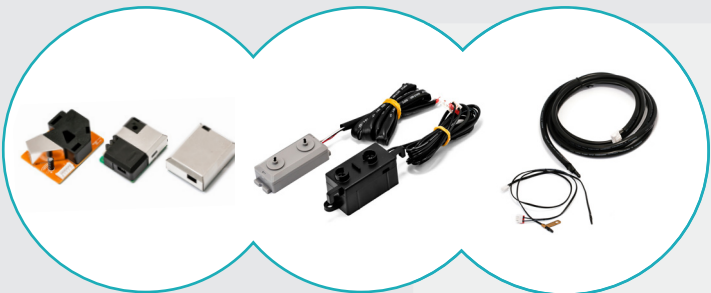


Throttle Position Sensor (TPS)

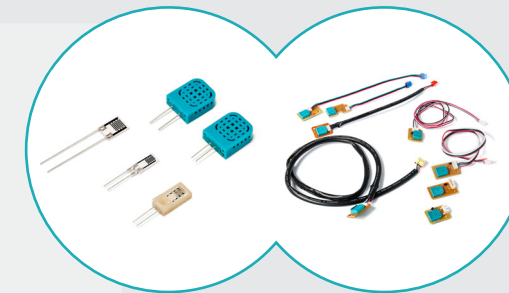


# Sensors Overview

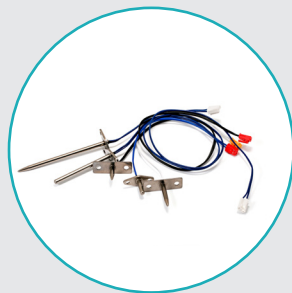
## White Goods



**Dust Sensor, Ionizer**  
Air conditioner, Air purifier



**Humidity Sensor**  
Dehumidifier, Humidifier, Air purifier



**Temperature Sensor**  
Washer, Dryer



**Temperature Sensor**  
Refrigerator, Heater  
Bidet, Boiler

## NTC Thermistors

NTC Thermistors are electronic components which reduce the resistance when the temperature increases. NTC Thermistors which is made of fine-ceramic semiconductors can handle the temperature range of -50°C to 500°C.

Thermistors are widely used as temperature sensors for various industrial equipment and medical Applications. They are small in size, cheap in price, and high in quality. Demand for thermistors as temperature controller in various electric and electronic instruments has been also increased dramatically in recent years.

Sangshin Elecom supplies thermistors with superior technological designs at competitive and stable prices.

## Factors for Thermistor Characteristics

### 1. Zero-power resistance of thermistor : R

$$R = R_0 \exp \left[ B \left( \frac{1}{T} - \frac{1}{T_0} \right) \right]$$

$R_0$  and  $R$  indicate resistance value in the ambient temperature  $T_0$  and  $T$ (K) respectively.  
(K : absolute temperature)

### 2. B-value of thermistor : B(K)

$$B = \frac{\ln \left( \frac{R_0}{R_1} \right)}{\frac{1}{T} - \frac{1}{T_1}}$$

### 3. Thermal dissipation factor :

Indicated as exhausted electric power when thermistor temperature rises 1°C by self-heating.

### 4. Thermal time constant : (in second)

Time in which the thermistor temperature changes 63.2% of its temperature difference between  $T_1$  and  $T_2$ .

## KCL Series

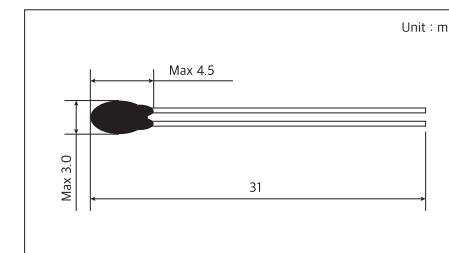
### Features

- Rapid response
- Compact size
- Proven stability and reliability
- Custom probe assemblies are available

### Configuration



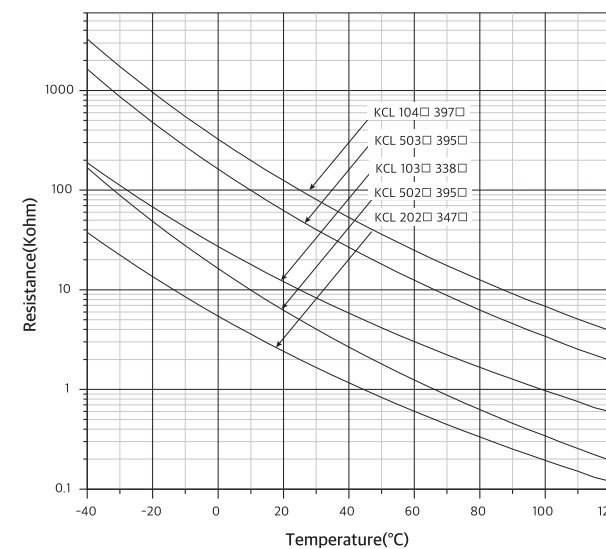
### Dimensions



### Characteristics

- Operating Temperature range: -40 ~ +120°C
- Thermal Time Constant: max. 2sec (in still oil)
- Heat Dissipation Constant: 1mW/°C (in still oil)

### Specification



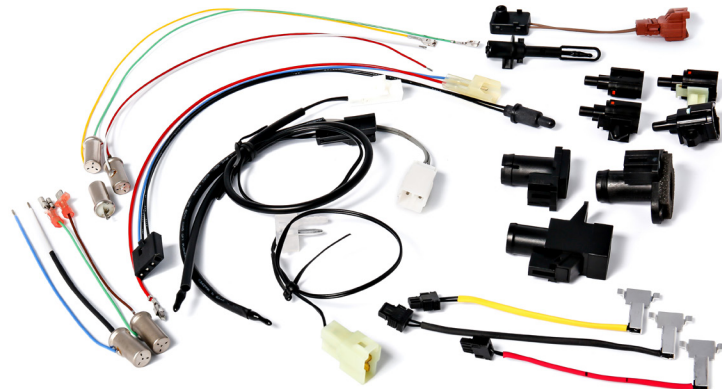
PART NUMBER	Nominal Resistance (25°C)	Constant B (25/85°C)
KCL 202□ 397□	2.000	3970K
KCL 202□ 352□	2.000	3520K
KCL 212□ 339□	2.185	3390K
KCL 262□ 388□	2.650	3880K
KCL 502□ 397□	5.000	3970K
KCL 502□ 333□	5.000	3325K
KCL 103□ 397□	10.000	3970K
KCL 103□ 343□	10.000	3435K
KCL 103□ 352□	10.000	3520K
KCL 103□ 414□	10.000	4142K
KCL 303□ 395□	30.000	3950K
KCL 303□ 420□	30.000	4200K
KCL 503□ 399□	50.000	3990K

## Thermistor Assembly for Automobile

### Features

- Sensors used in power units should endure severe environments with oil, mist, humidity, dust and vibration. Sensors in climate systems should quickly and accurately sense both inside and outside condition of a car to make ride comfortable, for example. Sensors should be stable for a long period of time.
- Our automotive sensors are designed to meet all the requirements for various applications, including reliability and stability.
- A variety of other sensors are also available for power units and climate systems.
- We are ready to make custom-specific sensors upon customers request.

### Configuration



### Applications

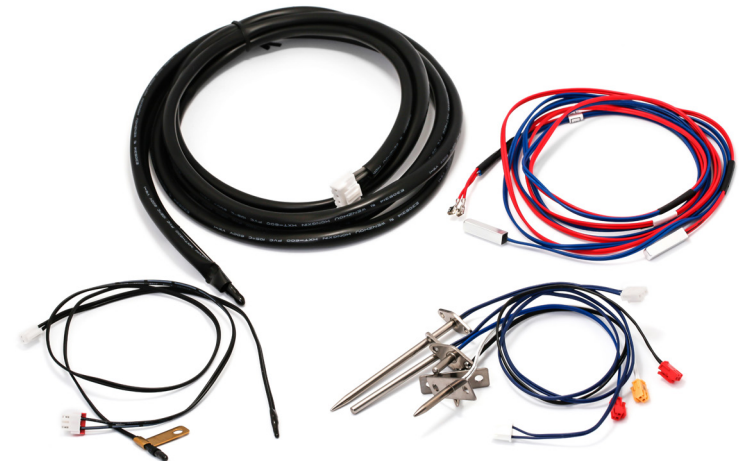
- Detection temperature of Cooling water
- Intake air
- EGR system
- Air conditioner (indoor, ambient, duct and outdoor)

## Thermistor Assembly for White Goods

### Features

Temperature sensors, used in the clothes dryer, dish washer/dryer, washing machine, etc. should have moisture and water resistance. Humidity sensors used in highly humid environment must endure in a dewing and bone-dry condition. Various sensors used in air conditioning apparatus and in freezing apparatus should withstand severe temperature change in a damp environment. The air flow sensor should accurately detect clogging in ducts and filters. Sangshin sensor is designed to meet the key requirements, heat resistance, humidity resistance, thermal resistance cycle, and thermal response as well as high quality and reliability.

### Configuration



### Applications

- Air conditioner
- Refrigeration
- Heater
- Washer
- Air purifier
- Humidifier
- Boiler
- Bidet

## Ambient Sensor

Ambient sensor measures the outside temperature of a vehicle.



### Key Features

- Low scattering for electrical characteristics
- Rapid response
- Superior durability

### Characteristics

- Operating temperature range : -40°C~90°C
- Thermal constant(sec) : max. 25sec (Stagnant Air)

## In-Car Sensor

In-Car Sensor measures the internal temperature to control the temperature automatically.



### Key Features

- Low scattering for temperature characteristics
- Rapid response
- Superior durability

### Characteristics

- Operating temperature range : -40°C~90°C
- Thermal constant(sec) : max. 25sec (Stagnant Air)

## Battery Pack Temperature Sensor

Battery Pack Temperature Sensor measures the temperature of battery pack of hybrid cars.



### Key Features

- Low scattering for temperature characteristics
- Feasibility for various characteristics
- Superior durability

### Characteristics

- Configured Region : Battery Pack
- Operating temperature range : -40°C~120°C

## Fuel Warning Sensor

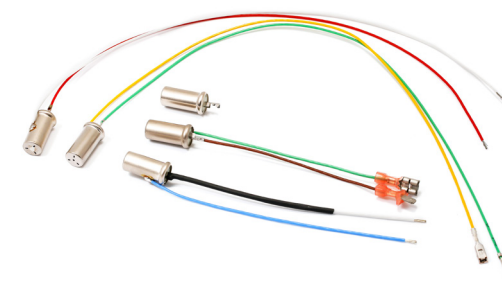
### Features

- Low cost and high stability
- Chip type
- Rapid response

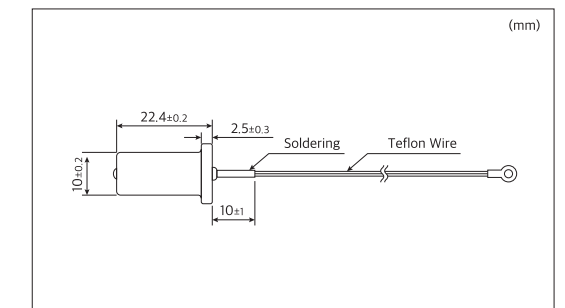
### Applications

- Gasoline Automobile
- Diesel Automobile
- Gasohol Automobile

### Configuration



### Dimensions



### Specification for Gasoline Automobile

RESISTANCE CHARACTERISTICS		NO	RATINGS	
Nominal Resistance (25°C)	1,000Ω ± 15%	1	Rating Voltage	DC 12V
	950Ω ± 175Ω	2	Operating Voltage Range	DC 8 ~ 16V
B Value (25/50)	2,000K ± 5%	3	Operating Temperature Range	-40°C ~ 80°C
Detection Time	180sec max	4	Light ON Current	135mA min.
Saturation	60mA max	5	Light OFF Current	60mA min.
Rating LOAD : DC 12V, 3.4W electric bulb for automobiles				

### Specification for Diesel Automobile

RESISTANCE CHARACTERISTICS		NO	RATINGS	
Nominal Resistance (25°C)	1,150Q ± 75Q	1	Rating Voltage	DC 12V
		2	Operating Voltage Range	DC 8 ~ 16V
B Value (25/50)	2,000K ± 5%	3	Operating Temperature Range	-40°C ~ 80°C
Detection Time	400sec max	4	Light ON Current	135mA min.
Saturation	80mA max	5	Light OFF Current	80mA min.



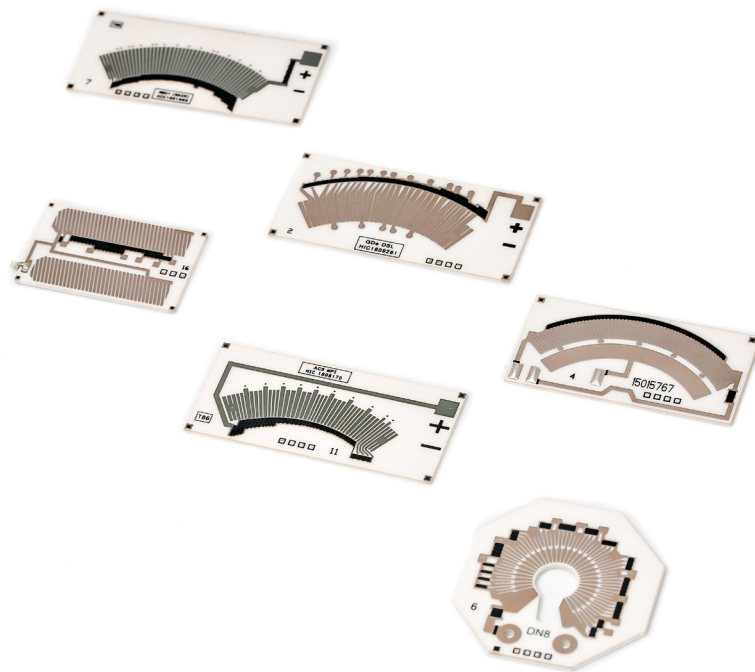
## Ceramic Resistor Card

The low-cost fuel level sensors detect the fuel level in the fuel tank by using a float. Suitable for motorcycles, automobiles and all kinds of industrial equipment. This sensor has reliable sliding contact points and resistance electrodes.

### Features

- Electrical characteristics of low dispersion
- Display the correct amount of fuel through the prevention of sulfide
- Excellent durability

### Configuration



### Characteristics

- Configured region : Fuel Tank inside
- Operating temperature range : -40°C - 90°C
- Operating fuel : Diesel, Gasoline

## Throttle Position Sensor (TPS)

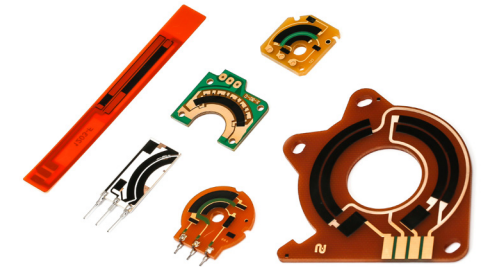
TPS (Throttle Position Sensor) monitors the throttle valve angle which optimizes fuel consumption and emission, especially in transient conditions.

### Features

- Excellent flexibility
- Good adhesive strength
- Good chemical-proof

### Characteristics

- Resistance range : -40°C - 120°C
- RoHS compliance : 1KΩ - 10KΩ



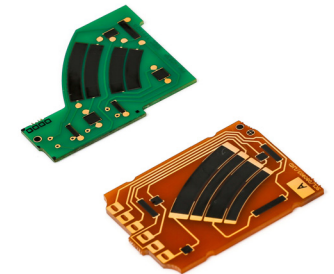
## Acceleration Pedal Position Sensor (APS)

### Applications

- Agricultural and construction equipment
- Heavy, off-road equipment
- Short stroke linear position sensor

### Characteristics

- Resistance range : -400°C~120°C
- RoHS compliance : 1KΩ -10KΩ



## Continuous Wear Sensor (CWS)

### Applications

- Heavy, off-road equipment
- Brake pads wear indicator for automobile

### Characteristics

- Resistance range : -400°C~120°C
- RoHS compliance : 1KΩ -10KΩ



## Humidity Sensor

### What's Relative Humidity?

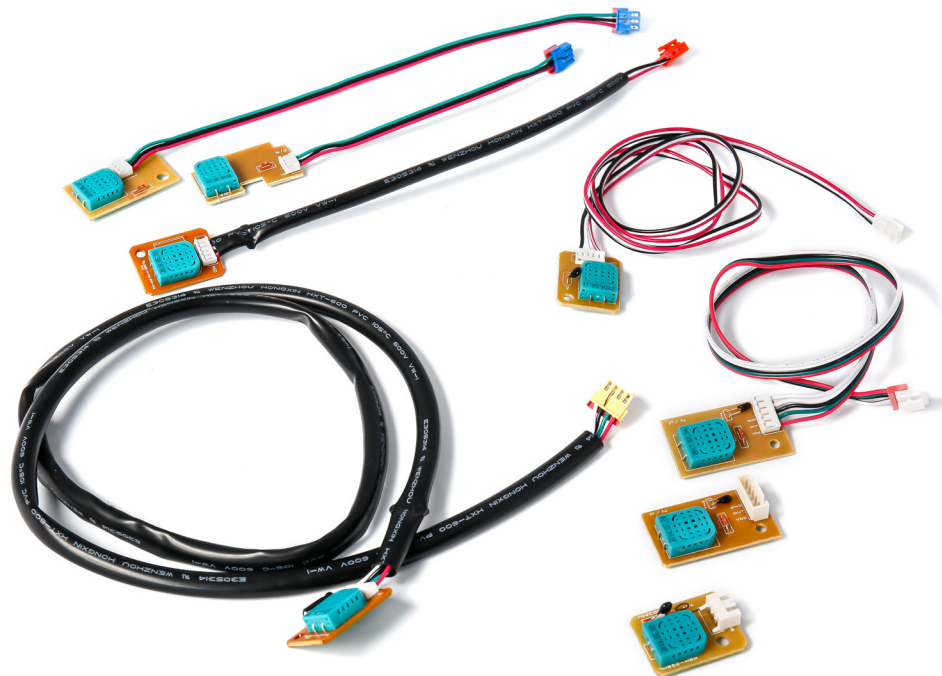
Relative humidity is defined as the ratio of the current amount of water vapor in the air to the maximum amount to be contained at the current air temperature.

For example, the air at 20°C can hold, at a maximum, about 17grams of water vapor per cubic meter. Air holding this much moisture is considered "saturated" and said to have 100% relative humidity. If the air dries up to the point where it only contains 8.5grams of moisture per cubic meter, then the air is holding 50% of its maximum capacity. The relative humidity is 50% then.

The capacity of air to hold water vapor is heavily dependent on its temperature. The warmer the air, the more moisture it can contain. The air can hold about 30grams of moisture per cubic meter at 30°C or about 75% more than it can at 20°C.

The air at 60°C can hold water about fifteen times than at 10°C.

Sometimes absolute humidity is used as a measure. It denotes the actual amount of water vapor in the air in gram per cubic meter.



## Resistive Humidity Sensor

KSH-01B/02B & KSH-03B/04B

### Key Features

- Humidity range 20%RH ~ 95%RH
- Rapid response
- Low hysteresis
- Small and light – weight
- Attractively priced
- Robust construction

### Applications

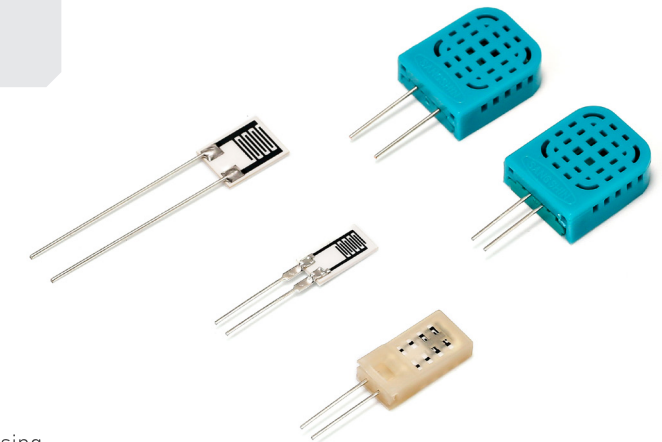
- Humidifier & Dehumidifier
- Air conditioner
- Automobile
- Printer
- Copier
- Food industry equipment, etc.

### Part Numbering

**KSH-01BHL**

①      ②      ③      ④      ⑤

- Sangshin Elecom Humidity Sensor
- Substrate Type
  - 01: Size: 5x10mm, 23KΩ
  - 02: Size: 5x10mm, 31KΩ
  - 03: Size: 8x10mm, 23KΩ
  - 04: Size: 8x10mm, 31KΩ
- Resistance Type
- Tolerance:
  - H – 3%, J – 5%
- Housing Type
  - S – 7x14x3.3mm,
  - L – 13.6x16.5x5.5mm, N – No Housing

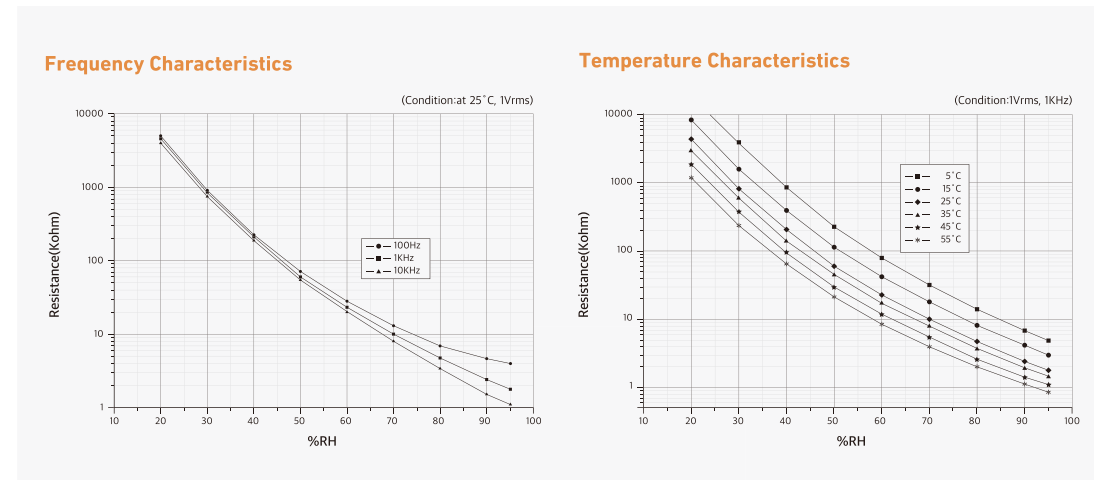


### Specification

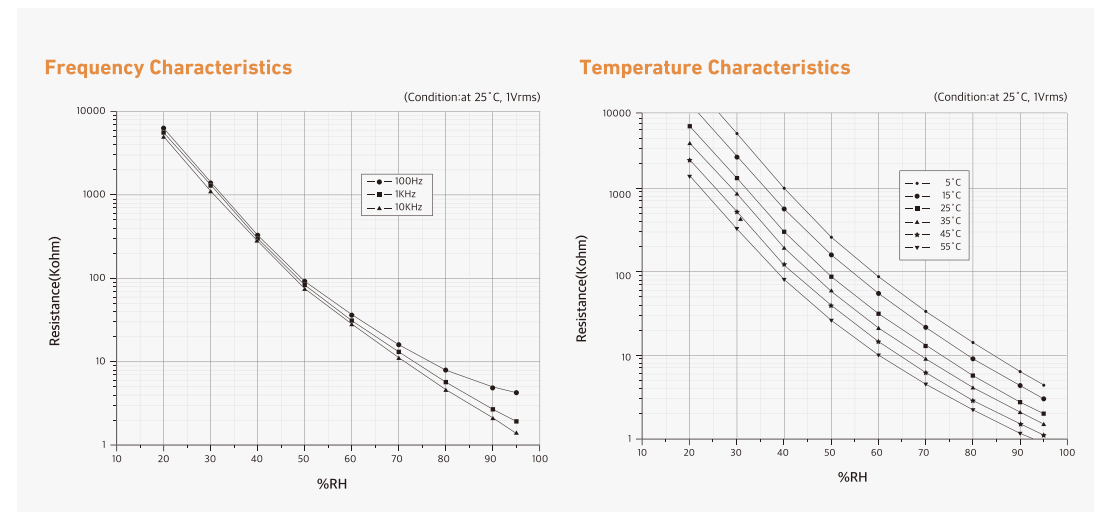
	KSH-01B & KSH-03B	KSH-02B & KSH-04B
Rated Voltage	1VAC	
Rated Power	0.3mW	
Operating Temperature Range	0°C ~60°C	
Operating Humidity Range	20%RH - 95%RH	
Storable Temperature	-20°C - 85°C	
Standard Humidity Resistance	23KΩ (25°C, 60%RH)	31KΩ(25°C,60%RH)
Storable Humidity	95%RH or Less	
Humidity Detecting Accuracy	±3%RH, ±5%RH (25°C, 60%RH)	
Humidity Response characteristics	See chart	
Color of Sensor Case	BLACK	GREEN
Hysteresis	±2%RH (30%RH ~ 90%RH)	

## Resistive Humidity Sensor

### KSH-01B & KSH-03B



### KSH-02B & KSH-04B



### Handling Precautions

- Do not touch the sensing surface with bare hands and ensure no contact with adhesives, solder, flux, oil, grease, organic solvents (alcohol, acetone trichloroethylene, thinners, etc.) and ionized material such as tap water.
- Avoid to input DC voltage directly.

## Capacitive Humidity Sensor

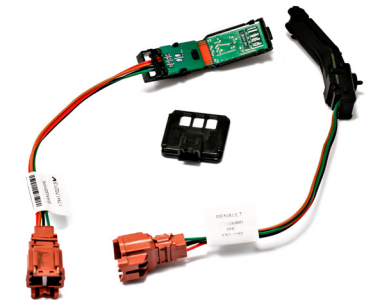
### Key Features

- Humidity range 0%RH~95%RH
- Rapid response
- Low hysteresis
- Small and light-weight
- Robust construction



### Applications

- Humidifier & Dehumidifier
- Air conditioner
- Automobile
- Printer
- Copier
- Food industry etc.



### Electrical Characteristics

Model	Humidity	Temperature
Rated voltage	DC5V±0.25V	
Rated Power	0.3mW	
Operating temperature Range	-40°C~120°C	
Operating Humidity Range	0%RH~100%RH	
Storable Temperature	-40°C~125°C	
Storable Humidity	95%RH or Less	
Detecting Accuracy	±3%RH(25°C, 60%RH)	±0.5°C
Response characteristics	ts < 10s	ts < 30s
Hysteresis	±2%RH(30%RH~90%RH)	

\* Optional : ±2%RH, ±0.2°C

## Dust Sensor

Sangshin dust sensor detects the dust particle concentration in air by using optical sensing method.



### Key Features

- High compatibility
- Stable operation
- High and consistent quality
- Sensitivity tuning available per customer requirement

### Applications

- Air washer
- Air purifier
- Air conditioner

### Part Numbering

**SDPN - 00YD**

1 2 3 4      5 6 7

- S : Sangshin
- D : Dust Sensor
- P : Output  
(P:PWM out / V:Voltage out / D: Dual Output)
- N : Sensitivity  
(N:PM10 Normal / A:PM10 Advanced / F:PM2.5)
- 00 : Pin out
- Y : Connector Type  
(Y:Yeonho - SMAW250 / J:JST - S5B-EH)
- D : Custom option

## SDPF Type (Infrared LED & Heater Type)



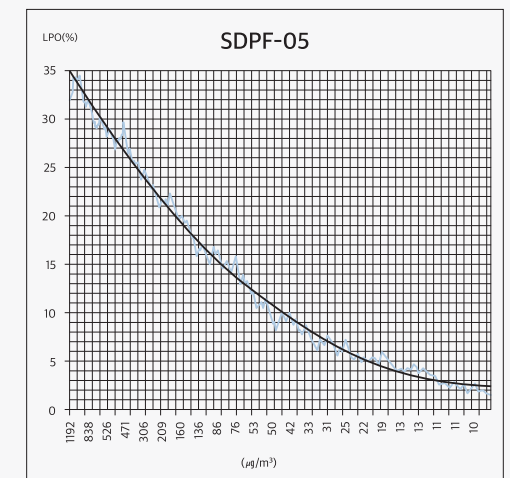
### Features

- Stable operation with power regulator
- Uniform quality supported by MI-COM calibration
- Sensitivity control per customer demand level
- Ensured product traceability

### Technical Specifications

- Supply Voltage: DC 5V ± 5% (Ripple: ≤30mV)
- Power Consumption: ≤100mA
- Operating Temperature Range: -10°C ~ 45°C
- Operating Humidity Range: 95%RH or less
- Dimension: W59 x H45 x D20 (mm)
- Detectable Particle Size: ≥0.1μm
- Output Method
  - Negative Logic Pulse Output (PWM)
  - Low Pulse Ratio (Hi: >4.5V, Lo: <0.7V)

### Sensor Characteristics (P2 Output)



## SDMF Type (Infrared LED & Fan Type)



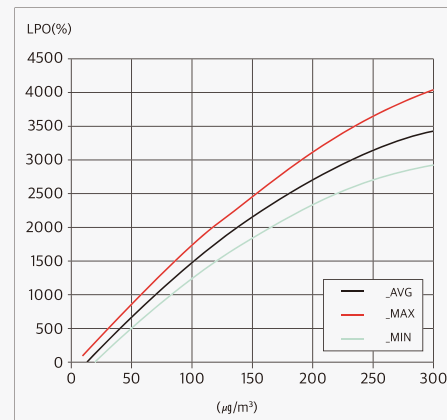
### Features

- IR LED enables longer life time and operability in high temperature (IR LED life time & operating temperature range : 100khs / - 40°C ~ 100°C)
- Fast response and high accuracy using a fan
- Uniform quality supported by MI-COM calibration
- I2C output (PM10, PM2.5)
- New design for low contamination and easier cleaning of the lens
- Lens cleaning hole
- Ensured product traceability
- Low noise fan (<20dBA:convert)

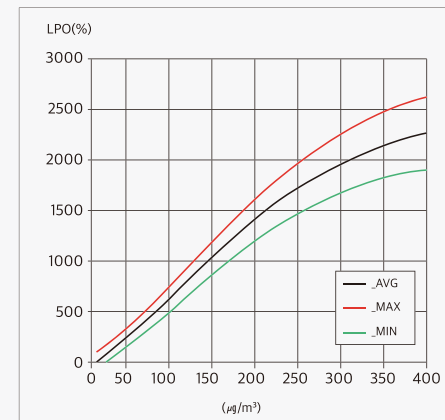
### Technical Specifications

- Supply Voltage : DC 5V ± 5% (Ripple: ≤30mV)
- Power Consumption : ≤ 90mA
- Accuracy : ±15% or 15μg/m<sup>3</sup>
- Operating Temperature Range : - 10°C ~ 60°C
- Operating Humidity Range : 85%RH or less
- Size : W48 x H37 x D18 (mm)
- Detectable Particle Size : >0.5μm
- Output Method
  - I<sup>2</sup>C output
  - PM10, PM2.5

### Sensor characteristics (P2 Output)



KCL Characteristic



JIS Characteristic

## SDLF Type (Laser & Fan Type)



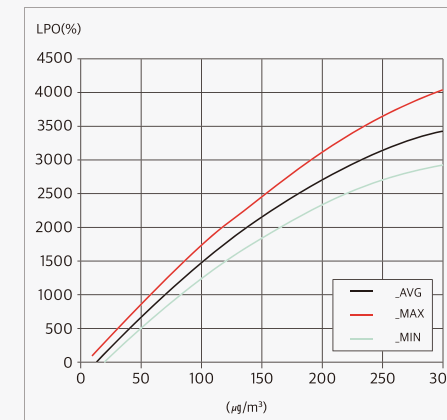
### Features

- High precision laser diode dust sensor
- Fast response and high accuracy using a fan
- Uniform quality supported by MI-COM calibration
- New design for low contamination and easier cleaning of the lens
- Ensured product traceability
- Low noise fan (<20dBA:convert)

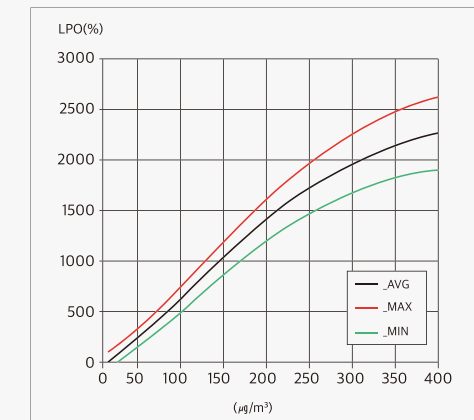
### Technical Specifications

- Supply Voltage : DC 5V ± 5% (Ripple: ≤30mV)
- Power Consumption : ≤ 90mA
- Accuracy : ±15% or 15μg/m<sup>3</sup>
- Operating Temperature Range : -10°C ~ 60°C
- Operating Humidity Range : 85%RH or less
- Size : W48 x H37 x D18 (mm)
- Detectable Particle Size : ≥0.5μm
- Output Method
  - I<sup>2</sup>C output
  - PM10, PM2.5

### Sensor characteristics (P2 Output)



KCL



JIS

## Ionizer



### Applications

- Air washer
- Air purifier
- Air conditioner

### Technical Specifications

- Amount of generated Ion (@100mm):
  - Positive ion :  $\geq 1,500,000$
  - Negative ion:  $\geq 1,500,000$
- Amount of generated ozone: 0.01 ppm
- Applicable standards:
  - Ion test : KCL-FIR-1106:2001
  - Ozone test : SPS-KACA002-132:2006

### Part Numbering

SIA1-116D

1 2 3 4 5

1. Sangshin Elecom
2. Ionizer
3. Power Supply (A1: AC 220V, D1: DC12V)
4. Output type (1: DC, 2: PWM, 3: AC)
5. Custom option

### Products

Model	Power	Output	Size(mm)
SIA1 Series	AC220V 50/60Hz, 2W	$\pm 3.6 (\pm 0.6)$ kV	75.5 x 28.1 x 36
SID1 Series	DC 10 ~15V, 1W	$\pm 3.6 (\pm 0.6)$ kV	69 x 27.5 x 25



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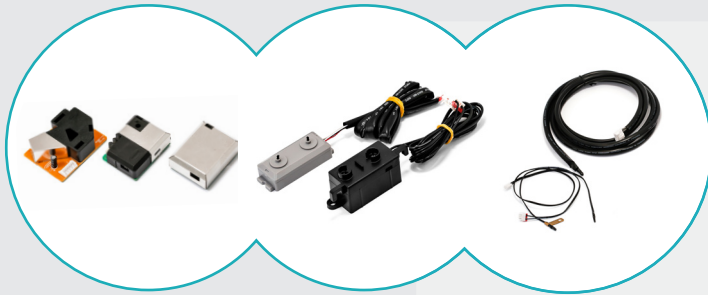
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**Shenzhen Office**

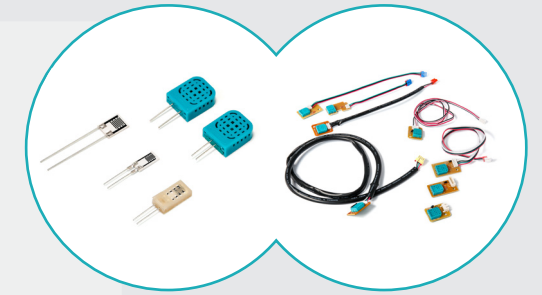
No.1923,B/D B, TianSha International Center, TaoYuan Rd,  
Nanshan District, ShenZhen, People's Republic of China  
Tel. +86 755 86703952

# Sensors Overview

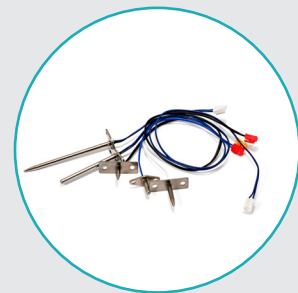
## White Goods



**Dust Sensor, Ionizer**  
Air conditioner, Air purifier



**Humidity Sensor**  
Dehumidifier, Humidifier, Air purifier



**Temperature Sensor**  
Washer, Dryer



**Temperature Sensor**  
Refrigerator, Heater  
Bidet, Boiler





## NTC Thermistors

NTC Thermistors are electronic components which reduce the resistance when the temperature increases. NTC Thermistors which is made of fine-ceramic semiconductors can handle the temperature range of -50°C to 500°C.

Thermistors are widely used as temperature sensors for various industrial equipment and medical Applications. They are small in size, cheap in price, and high in quality. Demand for thermistors as temperature controller in various electric and electronic instruments has been also increased dramatically in recent years.

Sangshin Elecom supplies thermistors with superior technological designs at competitive and stable prices.

## Factors for Thermistor Characteristics

### 1. Zero-power resistance of thermistor : R

$$R = R_0 \exp \left[ B \left( \frac{1}{T} - \frac{1}{T_0} \right) \right]$$

$R_0$  and  $R$  indicate resistance value in the ambient temperature  $T_0$  and  $T$ (K) respectively.  
(K : absolute temperature)

### 2. B-value of thermistor : B(K)

$$B = \frac{\ln \left( \frac{R_0}{R_1} \right)}{\frac{1}{T} - \frac{1}{T_1}}$$

### 3. Thermal dissipation factor :

Indicated as exhausted electric power when thermistor temperature rises 1°C by self-heating.

### 4. Thermal time constant : (in second)

Time in which the thermistor temperature changes 63.2% of its temperature difference between  $T_1$  and  $T_2$ .

## KCL Series

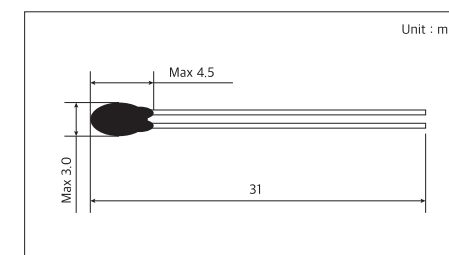
### Features

- Rapid response
- Compact size
- Proven stability and reliability
- Custom probe assemblies are available

### Configuration



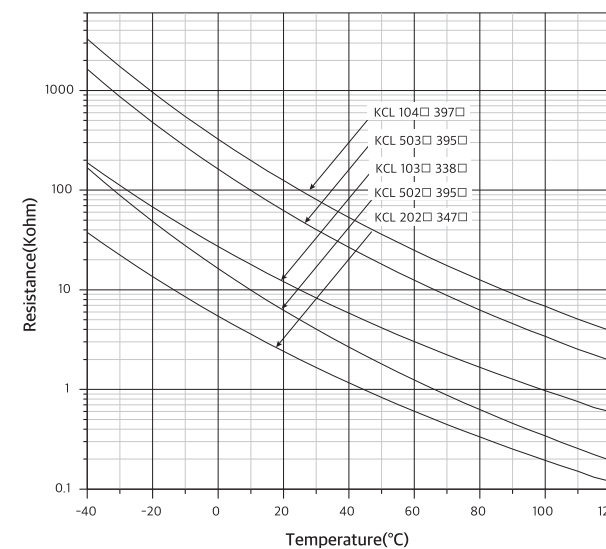
### Dimensions



### Characteristics

- Operating Temperature range: -40 ~ +120°C
- Thermal Time Constant: max. 2sec (in still oil)
- Heat Dissipation Constant: 1mW/°C (in still oil)

### Specification



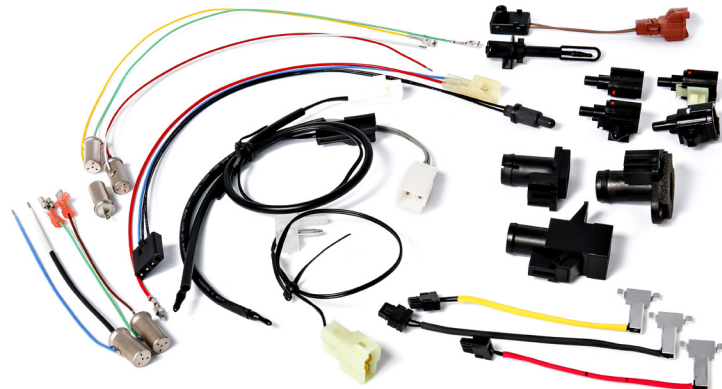
PART NUMBER	Nominal Resistance (25°C)	Constant B (25/85°C)
KCL 202□ 397□	2.000	3970K
KCL 202□ 352□	2.000	3520K
KCL 212□ 339□	2.185	3390K
KCL 262□ 388□	2.650	3880K
KCL 502□ 397□	5.000	3970K
KCL 502□ 333□	5.000	3325K
KCL 103□ 397□	10.000	3970K
KCL 103□ 343□	10.000	3435K
KCL 103□ 352□	10.000	3520K
KCL 103□ 414□	10.000	4142K
KCL 303□ 395□	30.000	3950K
KCL 303□ 420□	30.000	4200K
KCL 503□ 399□	50.000	3990K

## Thermistor Assembly for Automobile

### Features

- Sensors used in power units should endure severe environments with oil, mist, humidity, dust and vibration. Sensors in climate systems should quickly and accurately sense both inside and outside condition of a car to make ride comfortable, for example. Sensors should be stable for a long period of time.
- Our automotive sensors are designed to meet all the requirements for various applications, including reliability and stability.
- A variety of other sensors are also available for power units and climate systems.
- We are ready to make custom-specific sensors upon customers request.

### Configuration



### Applications

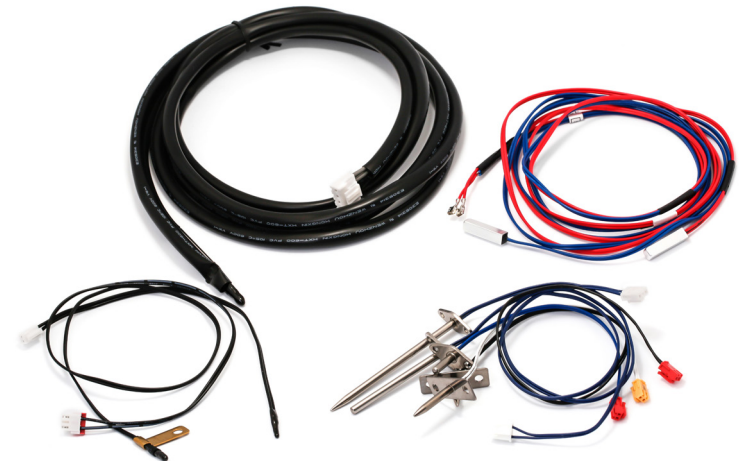
- Detection temperature of Cooling water
- Intake air
- EGR system
- Air conditioner (indoor, ambient, duct and outdoor)

## Thermistor Assembly for White Goods

### Features

Temperature sensors, used in the clothes dryer, dish washer/dryer, washing machine, etc. should have moisture and water resistance. Humidity sensors used in highly humid environment must endure in a dewing and bone-dry condition. Various sensors used in air conditioning apparatus and in freezing apparatus should withstand severe temperature change in a damp environment. The air flow sensor should accurately detect clogging in ducts and filters. Sangshin sensor is designed to meet the key requirements, heat resistance, humidity resistance, thermal resistance cycle, and thermal response as well as high quality and reliability.

### Configuration



### Applications

- Air conditioner
- Refrigeration
- Heater
- Washer
- Air purifier
- Humidifier
- Boiler
- Bidet

## Ambient Sensor

Ambient sensor measures the outside temperature of a vehicle.



### Key Features

- Low scattering for electrical characteristics
- Rapid response
- Superior durability

### Characteristics

- Operating temperature range : -40°C~90°C
- Thermal constant(sec) : max. 25sec (Stagnant Air)

## In-Car Sensor

In-Car Sensor measures the internal temperature to control the temperature automatically.



### Key Features

- Low scattering for temperature characteristics
- Rapid response
- Superior durability

### Characteristics

- Operating temperature range : -40°C~90°C
- Thermal constant(sec) : max. 25sec (Stagnant Air)

## Battery Pack Temperature Sensor

Battery Pack Temperature Sensor measures the temperature of battery pack of hybrid cars.



### Key Features

- Low scattering for temperature characteristics
- Feasibility for various characteristics
- Superior durability

### Characteristics

- Configured Region : Battery Pack
- Operating temperature range : -40°C~120°C

## Fuel Warning Sensor

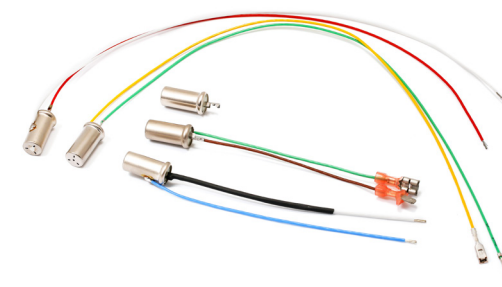
### Features

- Low cost and high stability
- Chip type
- Rapid response

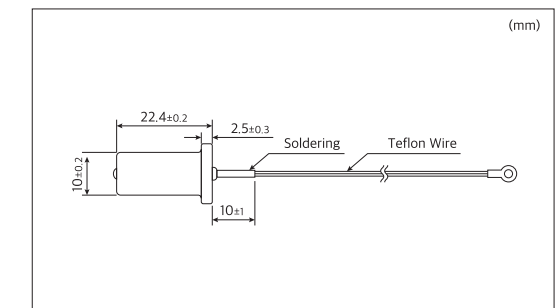
### Applications

- Gasoline Automobile
- Diesel Automobile
- Gasohol Automobile

### Configuration



### Dimensions



### Specification for Gasoline Automobile

RESISTANCE CHARACTERISTICS		NO	RATINGS	
Nominal Resistance (25°C)	1,000Ω ± 15%	1	Rating Voltage	DC 12V
	950Ω ± 175Ω	2	Operating Voltage Range	DC 8 ~ 16V
B Value (25/50)	2,000K ± 5%	3	Operating Temperature Range	-40°C ~ 80°C
Detection Time	180sec max	4	Light ON Current	135mA min.
Saturation	60mA max	5	Light OFF Current	60mA min.
Rating LOAD : DC 12V, 3.4W electric bulb for automobiles				

### Specification for Diesel Automobile

RESISTANCE CHARACTERISTICS		NO	RATINGS	
Nominal Resistance (25°C)	1,150Q ± 75Q	1	Rating Voltage	DC 12V
		2	Operating Voltage Range	DC 8 ~ 16V
B Value (25/50)	2,000K ± 5%	3	Operating Temperature Range	-40°C ~ 80°C
Detection Time	400sec max	4	Light ON Current	135mA min.
Saturation	80mA max	5	Light OFF Current	80mA min.

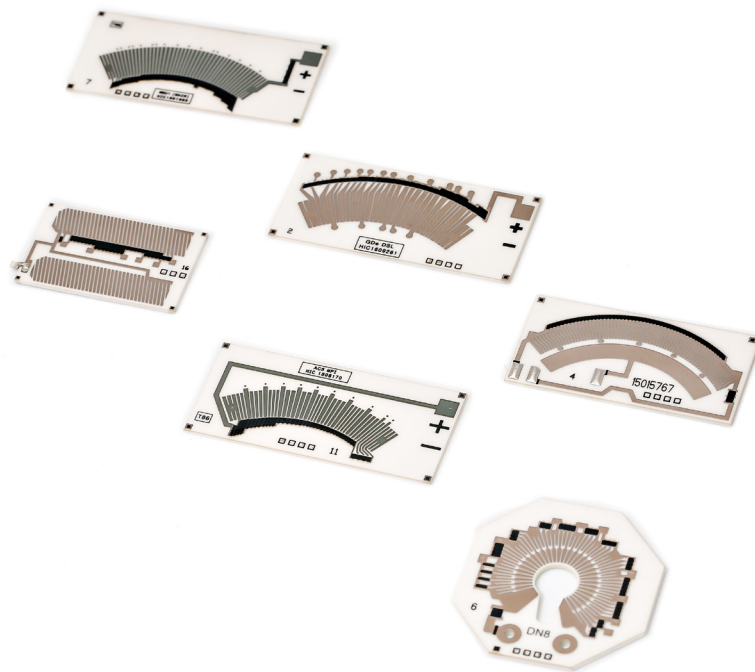
## Ceramic Resistor Card

The low-cost fuel level sensors detect the fuel level in the fuel tank by using a float. Suitable for motorcycles, automobiles and all kinds of industrial equipment. This sensor has reliable sliding contact points and resistance electrodes.

### Features

- Electrical characteristics of low dispersion
- Display the correct amount of fuel through the prevention of sulfide
- Excellent durability

### Configuration



### Characteristics

- Configured region : Fuel Tank inside
- Operating temperature range : -40°C - 90°C
- Operating fuel : Diesel, Gasoline

## Throttle Position Sensor (TPS)

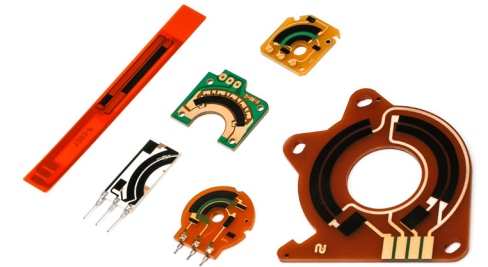
TPS (Throttle Position Sensor) monitors the throttle valve angle which optimizes fuel consumption and emission, especially in transient conditions.

### Features

- Excellent flexibility
- Good adhesive strength
- Good chemical-proof

### Characteristics

- Resistance range : -40°C - 120°C
- RoHS compliance : 1KΩ - 10KΩ



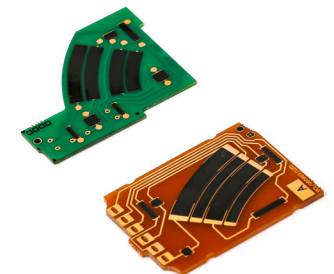
## Acceleration Pedal Position Sensor (APS)

### Applications

- Agricultural and construction equipment
- Heavy, off-road equipment
- Short stroke linear position sensor

### Characteristics

- Resistance range : -400°C~120°C
- RoHS compliance : 1KΩ -10KΩ



## Continuous Wear Sensor (CWS)

### Applications

- Heavy, off-road equipment
- Brake pads wear indicator for automobile

### Characteristics

- Resistance range : -400°C~120°C
- RoHS compliance : 1KΩ -10KΩ



## Humidity Sensor

### What's Relative Humidity?

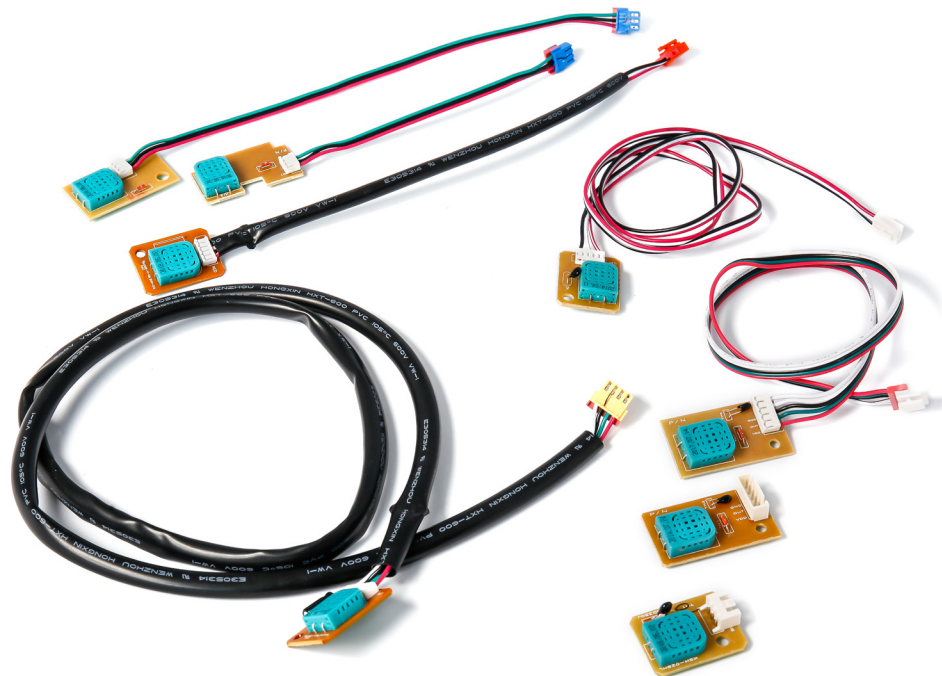
Relative humidity is defined as the ratio of the current amount of water vapor in the air to the maximum amount to be contained at the current air temperature.

For example, the air at 20°C can hold, at a maximum, about 17grams of water vapor per cubic meter. Air holding this much moisture is considered "saturated" and said to have 100% relative humidity. If the air dries up to the point where it only contains 8.5grams of moisture per cubic meter, then the air is holding 50% of its maximum capacity. The relative humidity is 50% then.

The capacity of air to hold water vapor is heavily dependent on its temperature. The warmer the air, the more moisture it can contain. The air can hold about 30grams of moisture per cubic meter at 30°C or about 75% more than it can at 20°C.

The air at 60°C can hold water about fifteen times than at 10°C.

Sometimes absolute humidity is used as a measure. It denotes the actual amount of water vapor in the air in gram per cubic meter.



## Resistive Humidity Sensor

KSH-01B/02B & KSH-03B/04B

### Key Features

- Humidity range 20%RH ~ 95%RH
- Rapid response
- Low hysteresis
- Small and light – weight
- Attractively priced
- Robust construction

### Applications

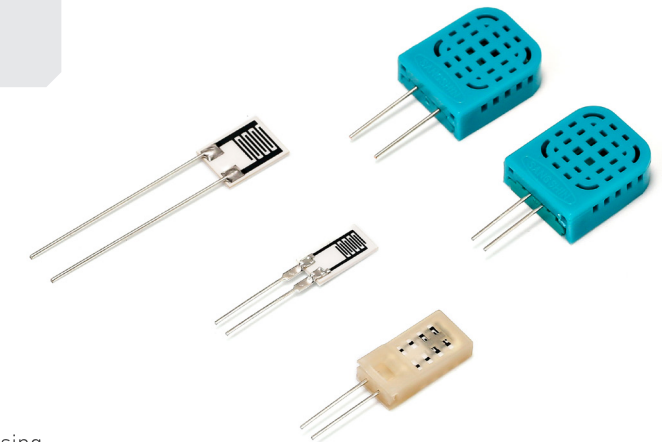
- Humidifier & Dehumidifier
- Air conditioner
- Automobile
- Printer
- Copier
- Food industry equipment, etc.

### Part Numbering

**KSH-01BHL**

①      ②      ③      ④      ⑤

- Sangshin Elecom Humidity Sensor
- Substrate Type
  - 01: Size: 5x10mm, 23KΩ
  - 02: Size: 5x10mm, 31KΩ
  - 03: Size: 8x10mm, 23KΩ
  - 04: Size: 8x10mm, 31KΩ
- Resistance Type
- Tolerance:
  - H – 3%, J – 5%
- Housing Type
  - S – 7x14x3.3mm,
  - L – 13.6x16.5x5.5mm, N – No Housing

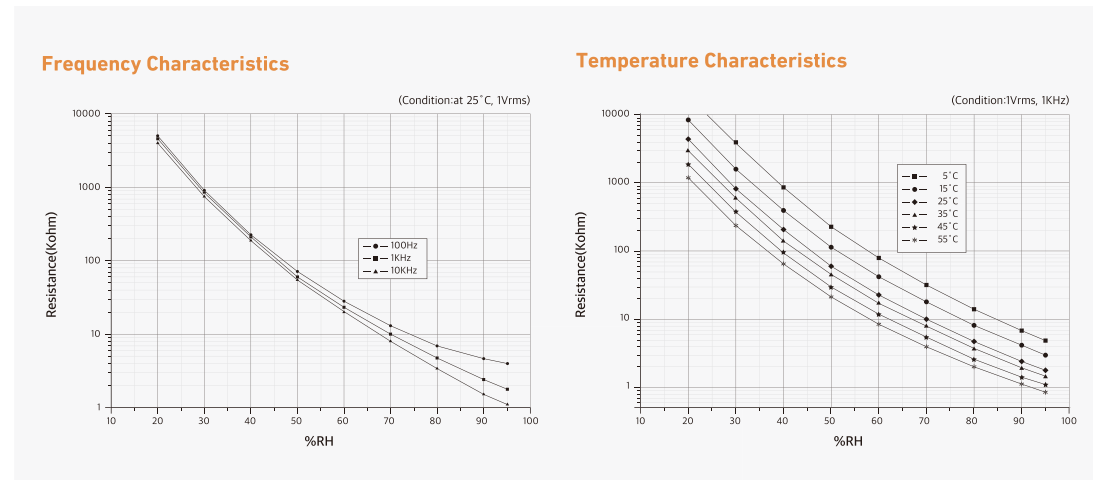


### Specification

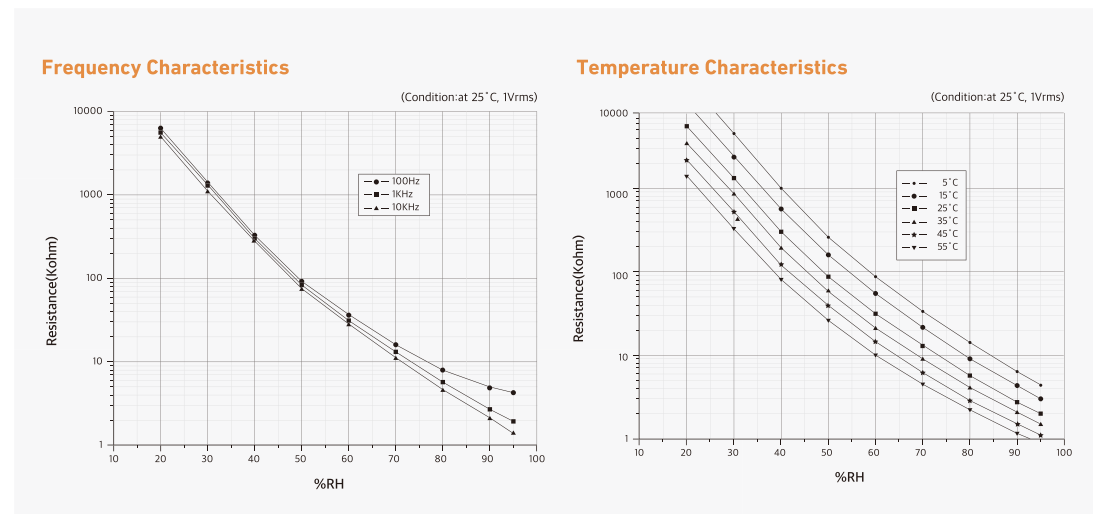
	KSH-01B & KSH-03B	KSH-02B & KSH-04B
Rated Voltage	1VAC	
Rated Power	0.3mW	
Operating Temperature Range	0°C ~60°C	
Operating Humidity Range	20%RH - 95%RH	
Storable Temperature	-20°C - 85°C	
Standard Humidity Resistance	23KΩ (25°C, 60%RH)	31KΩ(25°C,60%RH)
Storable Humidity	95%RH or Less	
Humidity Detecting Accuracy	±3%RH, ±5%RH (25°C, 60%RH)	
Humidity Response characteristics	See chart	
Color of Sensor Case	BLACK	GREEN
Hysteresis	±2%RH (30%RH ~ 90%RH)	

## Resistive Humidity Sensor

### KSH-01B & KSH-03B



### KSH-02B & KSH-04B



### Handling Precautions

- Do not touch the sensing surface with bare hands and ensure no contact with adhesives, solder, flux, oil, grease, organic solvents (alcohol, acetone trichloroethylene, thinners, etc.) and ionized material such as tap water.
- Avoid to input DC voltage directly.

## Capacitive Humidity Sensor

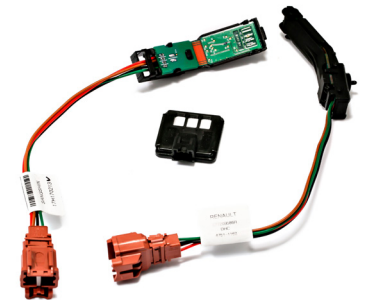
### Key Features

- Humidity range 0%RH~95%RH
- Rapid response
- Low hysteresis
- Small and light-weight
- Robust construction



### Applications

- Humidifier & Dehumidifier
- Air conditioner
- Automobile
- Printer
- Copier
- Food industry etc.



### Electrical Characteristics

Model	Humidity	Temperature
Rated voltage	DC5V±0.25V	
Rated Power	0.3mW	
Operating temperature Range	-40°C~120°C	
Operating Humidity Range	0%RH~100%RH	
Storable Temperature	-40°C~125°C	
Storable Humidity	95%RH or Less	
Detecting Accuracy	±3%RH(25°C, 60%RH)	±0.5°C
Response characteristics	ts< 10s	ts< 30s
Hysteresis	±2%RH(30%RH~90%RH)	

\* Optional : ±2%RH, ±0.2°C

## Dust Sensor

Sangshin dust sensor detects the dust particle concentration in air by using optical sensing method.



### Key Features

- High compatibility
- Stable operation
- High and consistent quality
- Sensitivity tuning available per customer requirement

### Applications

- Air washer
- Air purifier
- Air conditioner

### Part Numbering

**S D P N - 0 0 Y D**  
 1 2 3 4      5 6 7

- S : Sangshin
- D : Dust Sensor
- P : Output  
(P:PWM out / V:Voltage out / D: Dual Output)
- N : Sensitivity  
(N:PM10 Normal / A:PM10 Advanced / F:PM2.5)
- 00 : Pin out
- Y : Connector Type  
(Y:Yeonho - SMAW250 / J:JST - S5B-EH)
- D : Custom option

## SDPF Type (Infrared LED & Heater Type)



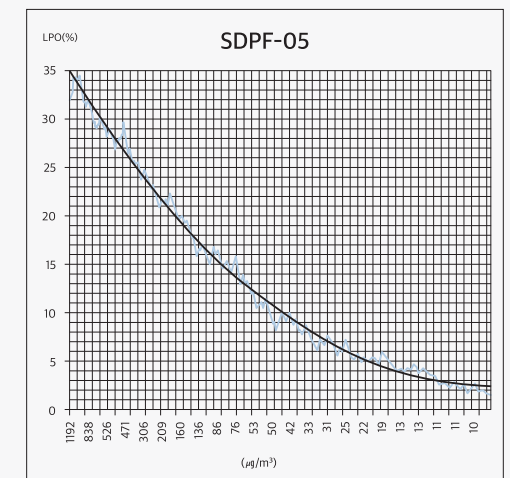
### Features

- Stable operation with power regulator
- Uniform quality supported by MI-COM calibration
- Sensitivity control per customer demand level
- Ensured product traceability

### Technical Specifications

- Supply Voltage: DC 5V ± 5% (Ripple: ≤30mV)
- Power Consumption: ≤100mA
- Operating Temperature Range: -10°C ~ 45°C
- Operating Humidity Range: 95%RH or less
- Dimension: W59 x H45 x D20 (mm)
- Detectable Particle Size: ≥0.1μm
- Output Method
  - Negative Logic Pulse Output (PWM)
  - Low Pulse Ratio (Hi: >4.5V, Lo: <0.7V)

### Sensor Characteristics (P2 Output)



## SDMF Type (Infrared LED & Fan Type)



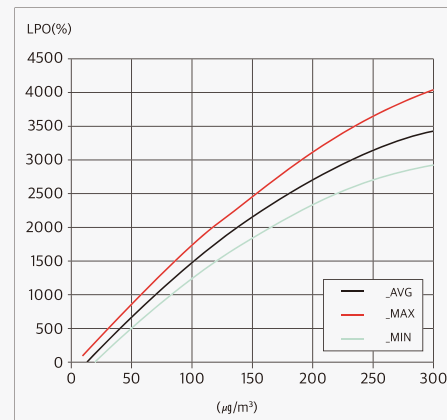
### Features

- IR LED enables longer life time and operability in high temperature (IR LED life time & operating temperature range : 100khs / - 40°C ~ 100°C)
- Fast response and high accuracy using a fan
- Uniform quality supported by MI-COM calibration
- I2C output (PM10, PM2.5)
- New design for low contamination and easier cleaning of the lens
- Lens cleaning hole
- Ensured product traceability
- Low noise fan (<20dBA:convert)

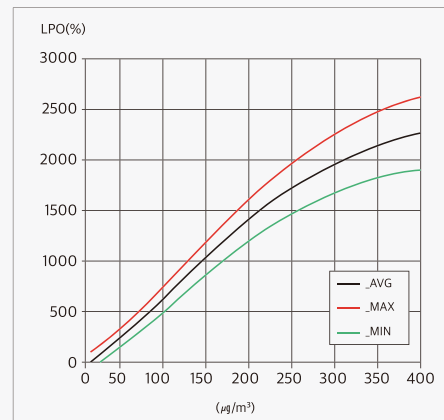
### Technical Specifications

- Supply Voltage : DC 5V ± 5% (Ripple: ≤30mV)
- Power Consumption : ≤ 90mA
- Accuracy : ±15% or 15μg/m<sup>3</sup>
- Operating Temperature Range : - 10°C ~ 60°C
- Operating Humidity Range : 85%RH or less
- Size : W48 x H37 x D18 (mm)
- Detectable Particle Size : >0.5μm
- Output Method
  - I<sup>2</sup>C output
  - PM10, PM2.5

### Sensor characteristics (P2 Output)



KCL Characteristic



JIS Characteristic

## SDLF Type (Laser & Fan Type)



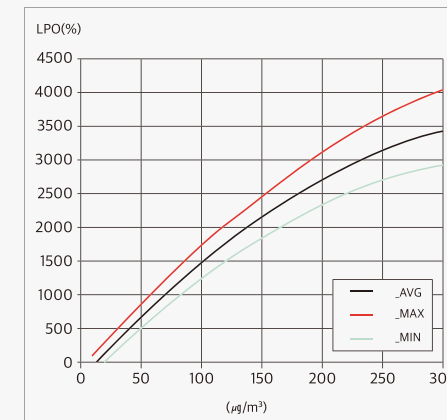
### Features

- High precision laser diode dust sensor
- Fast response and high accuracy using a fan
- Uniform quality supported by MI-COM calibration
- New design for low contamination and easier cleaning of the lens
- Ensured product traceability
- Low noise fan (<20dBA:convert)

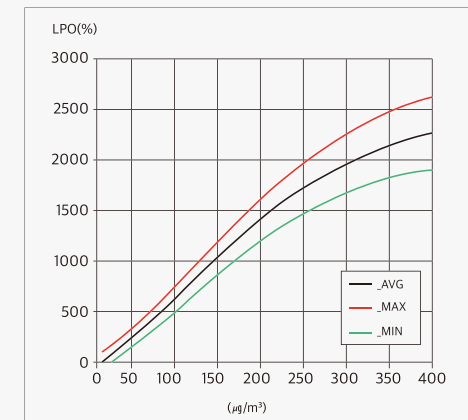
### Technical Specifications

- Supply Voltage : DC 5V ± 5% (Ripple: ≤30mV)
- Power Consumption : ≤ 90mA
- Accuracy : ±15% or 15μg/m<sup>3</sup>
- Operating Temperature Range : -10°C ~ 60°C
- Operating Humidity Range : 85%RH or less
- Size : W48 x H37 x D18 (mm)
- Detectable Particle Size : ≥0.5μm
- Output Method
  - I<sup>2</sup>C output
  - PM10, PM2.5

### Sensor characteristics (P2 Output)



KCL



JIS



## Ionizer



### Applications

- Air washer
- Air purifier
- Air conditioner

### Technical Specifications

- Amount of generated Ion (@100mm):
  - Positive ion :  $\geq 1,500,000$
  - Negative ion:  $\geq 1,500,000$
- Amount of generated ozone: 0.01 ppm
- Applicable standards:
  - Ion test : KCL-FIR-1106:2001
  - Ozone test : SPS-KACA002-132:2006

### Part Numbering

SIA1-116D

1 2 3 4 5

1. Sangshin Elecom
2. Ionizer
3. Power Supply (A1: AC 220V, D1: DC12V)
4. Output type (1: DC, 2: PWM, 3: AC)
5. Custom option

### Products

Model	Power	Output	Size(mm)
SIA1 Series	AC220V 50/60Hz, 2W	$\pm 3.6 (\pm 0.6)$ kV	75.5 x 28.1 x 36
SID1 Series	DC 10 ~15V, 1W	$\pm 3.6 (\pm 0.6)$ kV	69 x 27.5 x 25



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