东莞市一佳电子通讯科技有限公司
DONGGUAN YIJIA ELECTRONICS COMMUNICATION TECHNOLOGY CO., LTD

规 格 承 认 书

SPECIFICATION FOR APPROVAL

日 期 Date	2024/09/19
编 号 File No	24091901
版 本 Revision	1.0

客 户 CUSTOMER: 铁头科技

客户料号 CUSTOMER NO: 31112.00034.00.00

品 名 PART NAME: Zigbee Antenna L=45mm MHF

供方料号 SUPPLIER NO: YJL01.050.020.301A

送样日期Date: 送样数量Q'TY:

客户确认CUSTOMER APPROVED BY		
APPROVAL	CHIEF	SUPERVISOR

供方确认 SUPPLIER SIGNATURE		
APPROVAL	CHECK	DESIGN
ChenGuoqiang	XieLi	ChenXingyi

YJ-RD-F04-A

承认书项目表

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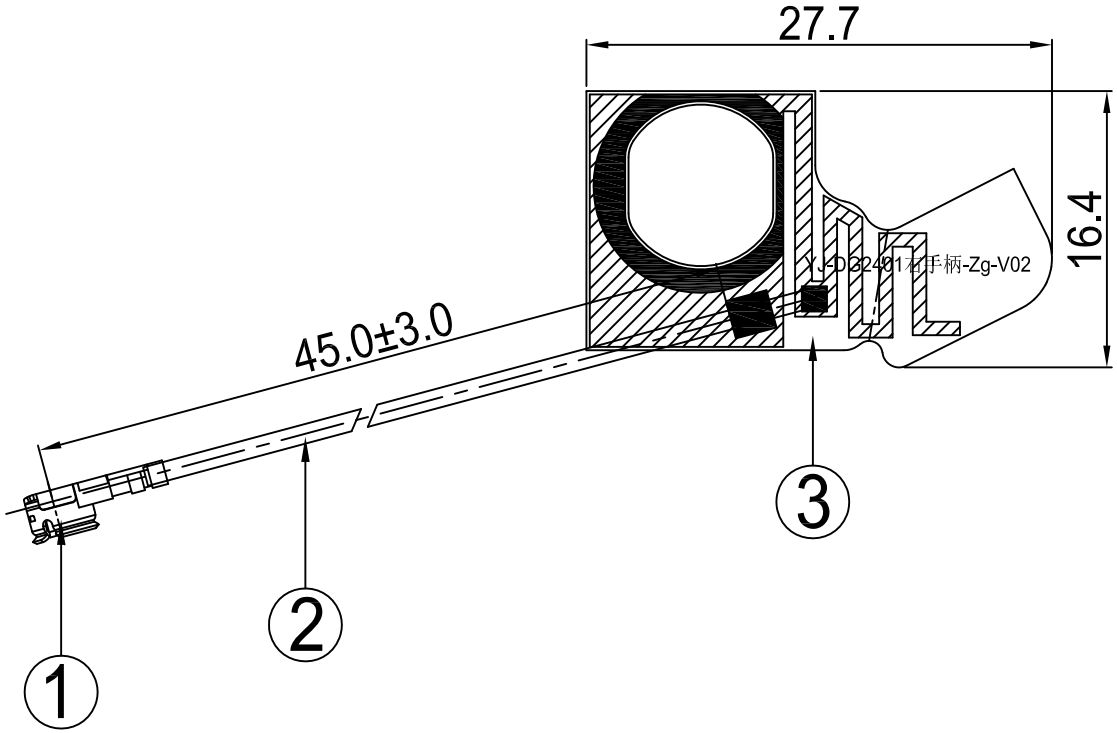
11	N/A	N/A	N/A
12	-	-	-
13	-	-	-

RoHS Compatible

CUSTOMER	
PART NO	

REV.	DESCRIPTION	DATE
A	首次发行	2024-07-18



NO	PART NAME	DESCRIPTION	Material	Q.TY
3	FPC	27.7*16.4mm	FPC	1
2	Coaxial Cable	O.D.1.13 Black	O.D.1.13	1
1	Mini Connector	Au Plated 1代	Cu	1

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PART NAME: Zigbee Antenna L=45mm MHF

PART NO.: YJL01.050.020.301A

DATE: 2024-07-18

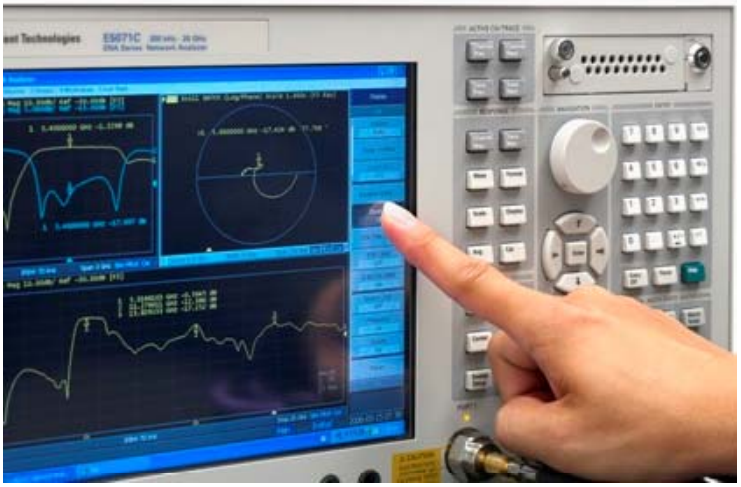
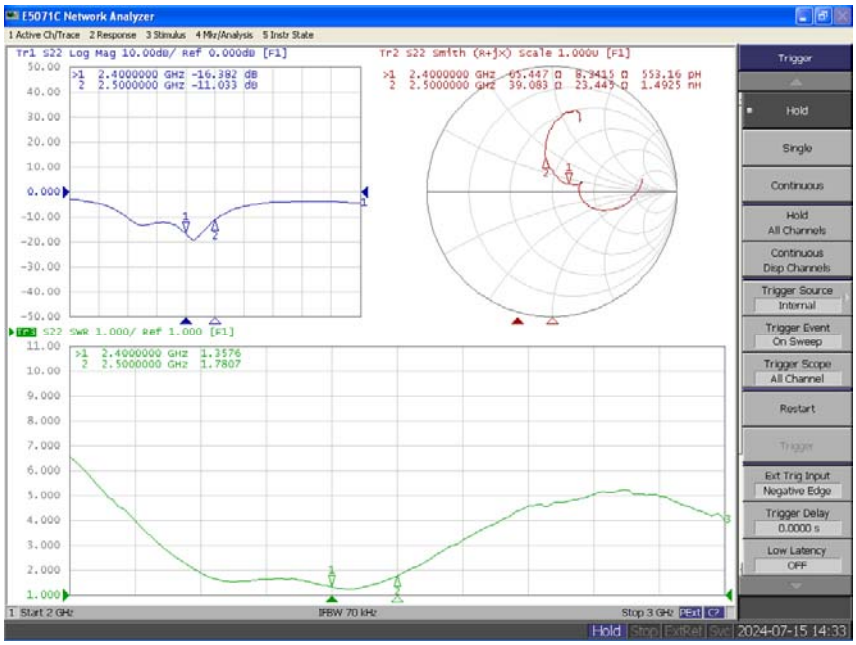
APPROVED BY	CHECKED BY	DESIGNED BY	
何清军	周颖杰	廖光喜	UNITS: mm SCALE: 1/1 REVISION: A

Tolerance
X.X ±0.50
X.XX±0.15
X° ±3°

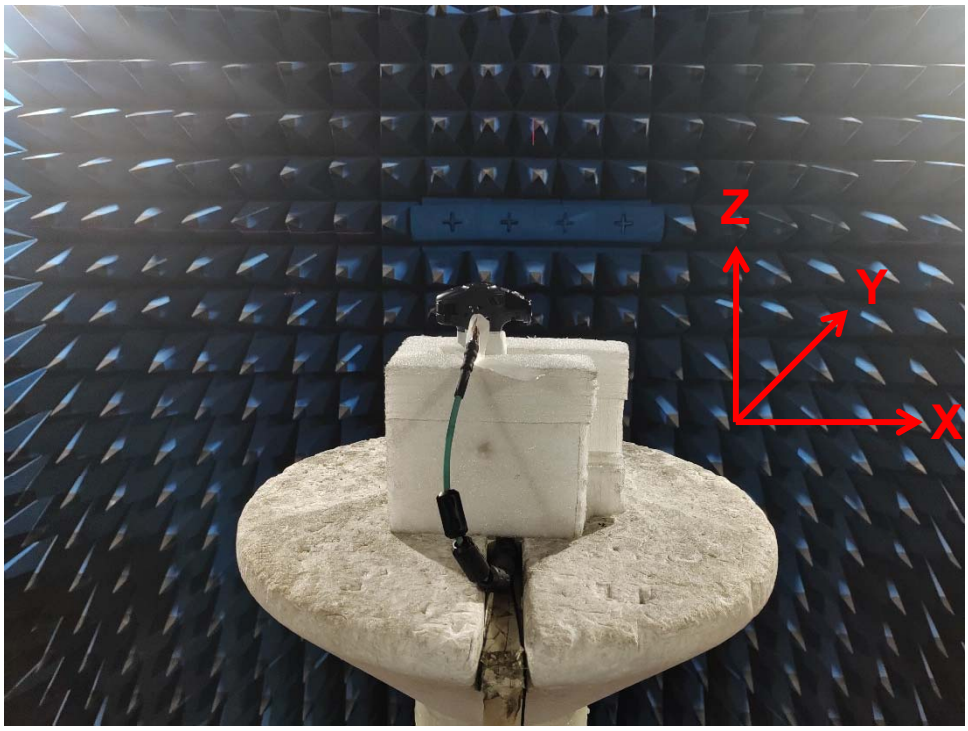
天线规格
Antenna Specification

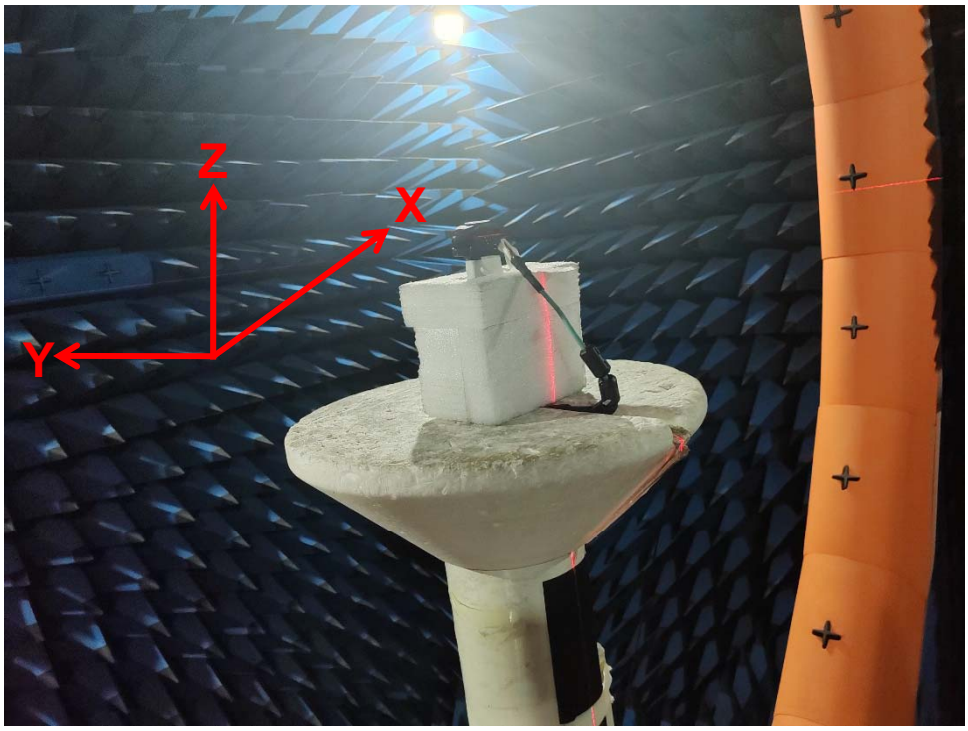
Electrical Properties	
Frequency	2.4-2.5GHz
Impedance	50 Ohm Nominal
V.S.W.R	2.0 Max
Gain	0.8 dBi
Radiation	Omni-directional
Polarization	Linear
Physical Properties	
Connector	1代IPEX
Cable Type	O.D.1.13mm
Cable Length	45mm
Cable Color	Black
Operating Temp.	-40 ~ +85 ˚C
Storage Temp / Humidity	25±5˚C / <70%

Antenna Performance Test

Agilent E5071B	
S Parameter Test // Zigbee Antenna	

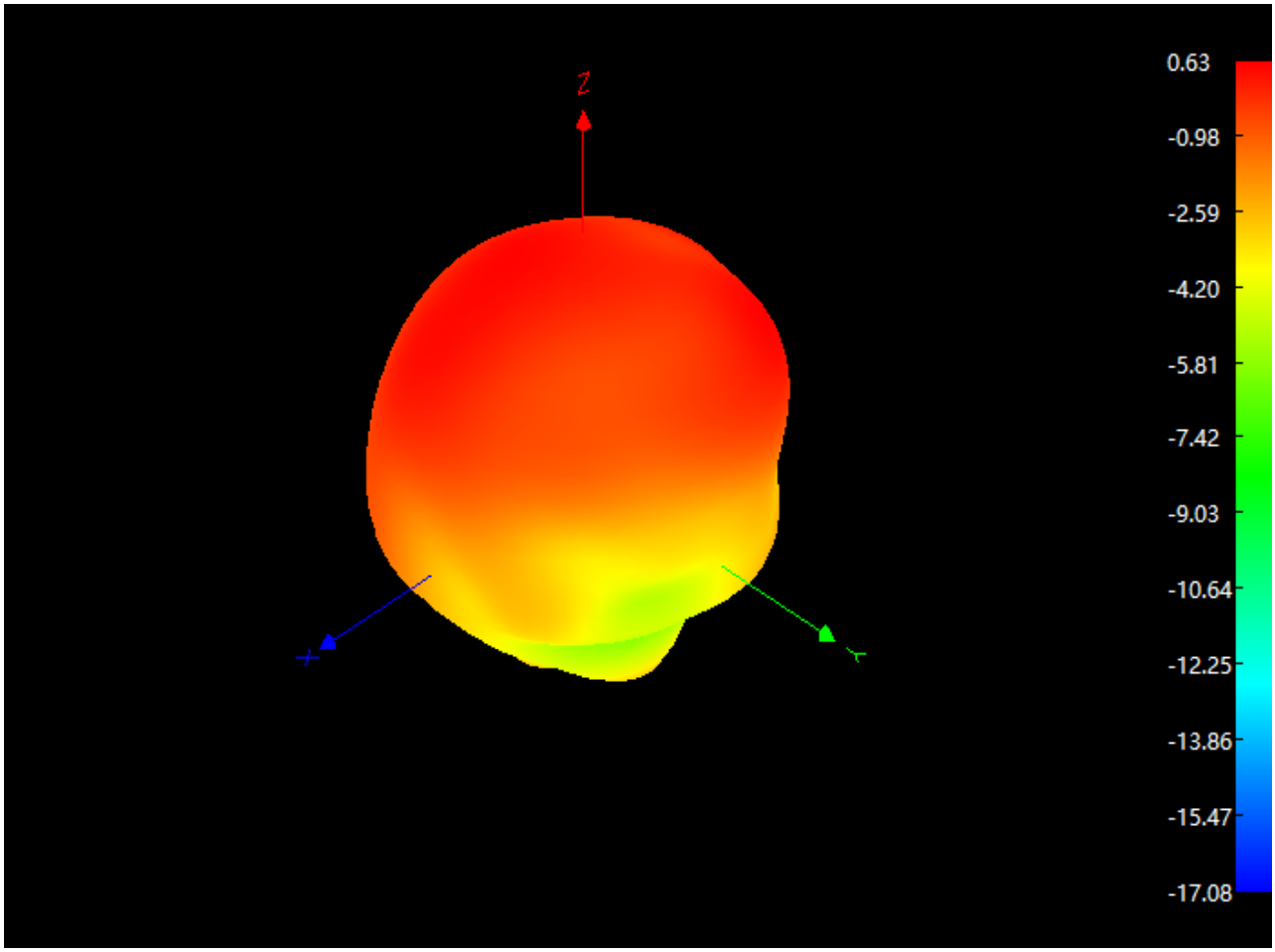
Antenna Passive Test





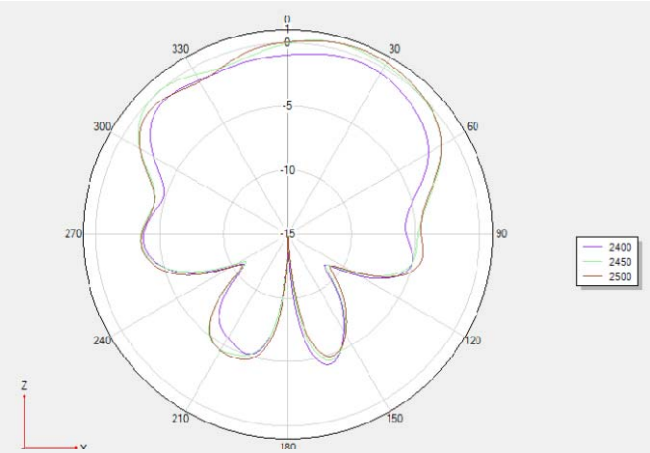
Passive Test For Zigbee Antenna(2.4G)			
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
2400	32.1	-4.9	0.3
2410	34.0	-4.7	0.4
2420	35.0	-4.6	0.4
2430	36.2	-4.4	0.4
2440	37.2	-4.3	0.5
2450	38.4	-4.2	0.6
2460	37.3	-4.3	0.6
2470	38.6	-4.1	0.6
2480	39.0	-4.1	0.7
2490	39.5	-4.0	0.8
2500	37.3	-4.3	0.8

Radiation Pattern For Zigbee Antenna(2450MHz)

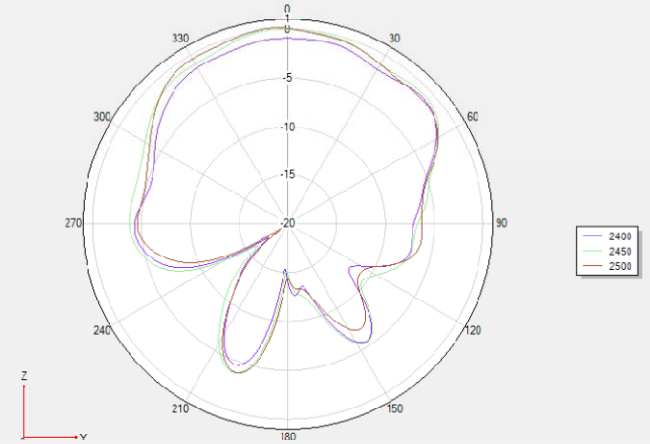


Radiation Pattern For Zigbee Antenna

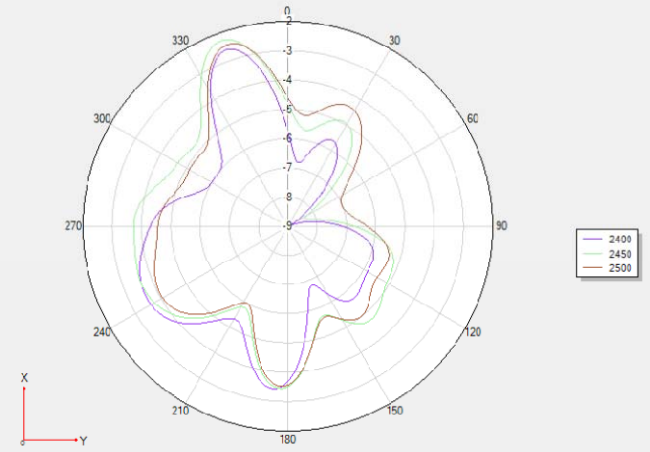
Phi 0°



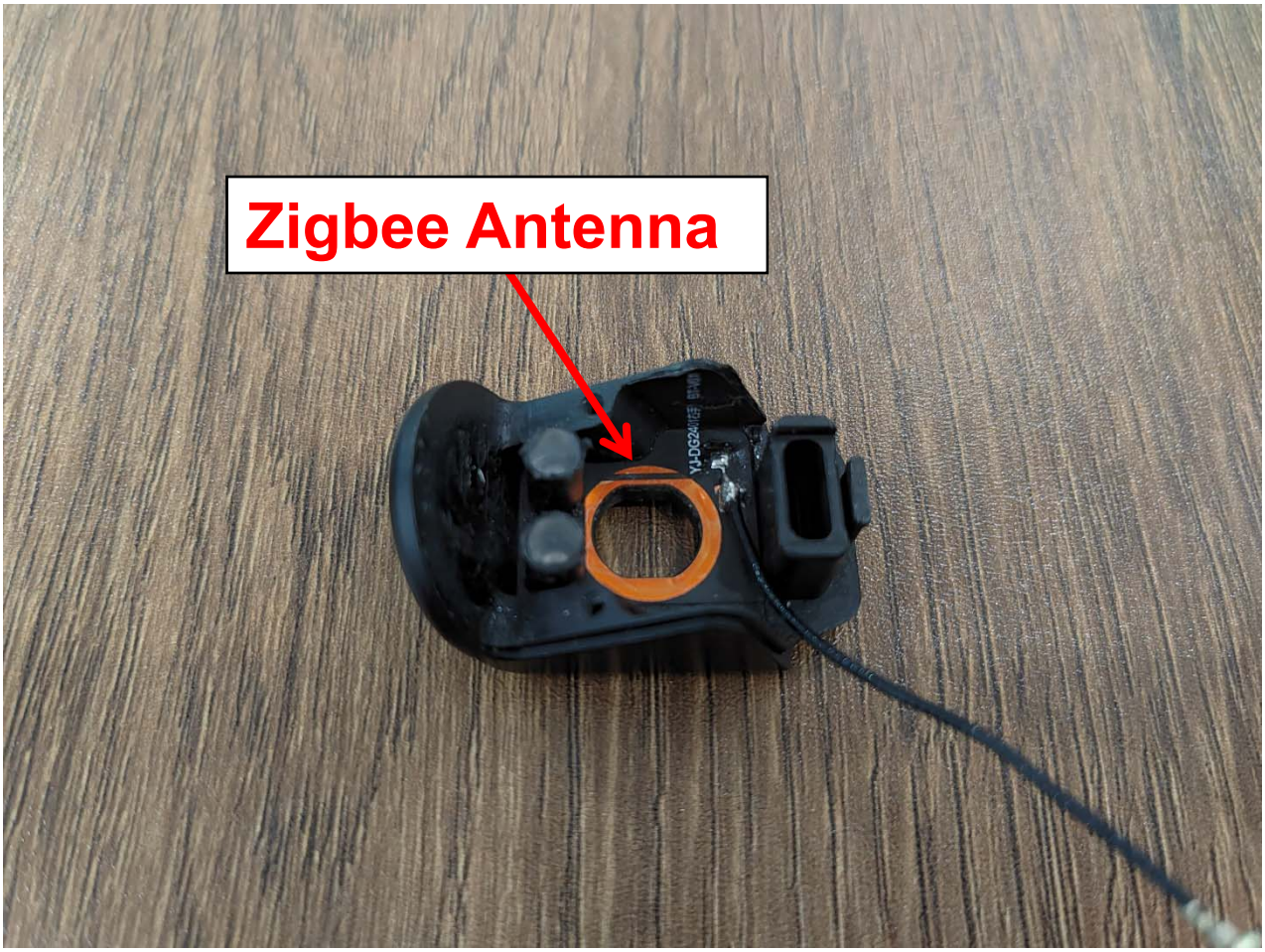
Phi 90°



Theta 90°



Device	
Zigbee Antenna	


Zigbee Antenna

Material safety data (MSDS)

1、 Item and manufacturer information page: 1 / 2

Item name: FPC antenna electroplated nickel and gold (flexible printed circuit)
Other names: FPC nickel gold coating
Recommended use and restricted use: communication products
Name of manufacturer or supplier: Dongguan Xiaoge Electronic Technology Co., Ltd
Address of manufacturer or supplier: 1 / 2 / F, Sanxing Road, Fenghuang Middle Road, Shajiao community, Humen Town, Dongguan City
Emergency contact / Fax:

2、 Hazard identification data

Hazard classification: other dangerous substances, acute toxic substances, grade 4 (swallowing, skin, inhalation)
Label content: Symbols: other dangerous objects, exclamation marks Warning: warning Hazard warning message: harmful if swallowed, harmful if inhaled Hazard prevention measures: put the container in a well ventilated place; avoid contact with skin and eyes; in case of accident or discomfort, consult medical treatment immediately
Other hazards:-

3、 Component identification data

mixture

Chinese and English Name: nickel CAS no.7440-02-0 percentage 98.95% Gold CAS no.7440-57-5 percentage 1% Brightener CAS no.6155-57-3 percentage 0.05%
Synonymous Name: gold finger nickel gold layer
Case No
Composition of hazardous substances (percentage of components)

4、 First aid measures

First aid methods for different exposure routes: Inhalation: - irritates respiratory tract Skin contact: wash the contact area with soap and water Eye contact: flush with plenty of water for more than 15 minutes and seek medical assistance Ingestion: drink plenty of water and seek medical assistance
The most important symptom and harmful effect: irritant.
Protection of first-aid personnel: wear class C protective equipment to implement first aid in safe area
Tips for doctors: patients should be given oxygen when inhaled.When swallowing, consider gastric lavage.

5、 Fire fighting measures

Suitable extinguishing agent: Carbon dioxide, chemical powder, water mist, alcohol foam.
Special hazards that may be encountered during fire fighting: When heated to dry, the salt will decompose to produce carbon monoxide and carbon dioxide.
Special fire fighting procedures: 1.Spray water mist to cool containers exposed to fire.2. Spray water to wash away the leakage to avoid exposure.
Special protective equipment for fire fighters: If necessary, wear a full body chemical protective respirator

6、 Physical and chemical properties page: 2 / 2

	State of matter	colour	smell	proportion	melting point	boiling point
NI	solid state	silvery white	tasteless	8.9	1453Temperature	2732Temperature
AU	solid state	yellow	tasteless	19.3	1064Temperature	2807Temperature
Brightener	liquid state	Light brown	tasteless	1.1	NA	NA

7、Safe handling and storage methods

management: Avoid contact with eyes, skin and clothing, wear personal protective equipment and do not inhale mist
Storage: Store in a cool, dry place

8、 Waste disposal methods

Waste disposal method: 1.According to the current laws and regulations. 2.According to the manufacturer's treatment, the waste to be treated should be treated first 3.In accordance with the relevant national and local government industrial wastewater discharge standards

9、 Leakage treatment method

Personal precautions: wear appropriate personal protective equipment.
Environmental precautions: ventilate the leakage area.

Cleaning method: dilute with a large amount of clean water, and wash and discharge to the ditch.

10、 Exposure precautions

Engineering control: 1. Local exhaust device; 2. Overall air exchange device; 3. The ventilation system should be made of corrosion-resistant materials and separated from other exhaust systems.

Control parameters			
Eight hour daily average Allowable concentration TWA	Short time volume average Allowable concentration STEL	Maximum permissible concentration CEILING	Biological indicators BEIs
1mg/m3	2mg/m3	-	-

Personal protective equipment:
Respiratory protection:-
Hand protection: impervious gloves made of natural rubber, butyl rubber and polyvinyl alcohol.
Eye protection: chemical safety goggles, face mask.
Skin and body protection: impermeable clothes and work shoes made of the above rubber materials

Health measures:
1.Take off contaminated clothes as soon as possible after work, and wash them before wearing or discarding them. Moreover, the laundry staff should be informed of the hazards of pollutants
2.Smoking or eating is strictly prohibited in the workplace.3. Wash hands thoroughly after handling.4. Keep the workplace clean

11、 Stability and reactivity

Stability:
It is stable under normal condition. If heated to the melting point, sublimation and decomposition may occur.

Possible hazardous reactions under special conditions:
1.Alkali: may react violently, producing heat and pressure.2. Oxidant (such as sodium chlorite, sodium hypochlorite): may produce violent or explosive reaction.3. Silver: may travel explosive silver oxalate.4. Alkali metals (such as sodium or potassium): may react violently to produce flammable hydrogen.5. Iron and ferrites (such as iron oxide): may react rapidly to form ferric oxalate.6. Acyl chloride: may react violently to form toxic fumigation.7. Heating

Conditions to avoid: heat

Substances to avoid:
1.Alkali.2. Oxidant 6. Acid

Hazardous decomposition products: None

12、 Toxicity information

Exposure route:-

Symptoms:-

Acute toxicity: none
Inhalation: None
Skin: no irritation
Eyes: no irritation
Ingestion: no burning sensation, abdominal pain, nausea, vomiting in the mouth and throat

Chronic toxicity or long-term toxicity:
1.May cause kidney stone, dysuria and pain.2. It may cause weight loss and chronic upper respiratory tract inflammation.3. It can cause local skin pain, ulceration or necrosis and nail discoloration.

13、 Ecological information

Biological toxicity: LC50 (FISH)-
EC50 (aquatic invertebrates)-
Bioconcentration coefficient:-

Persistence and degradation:-

Bioaccumulation: it is not likely to decompose in the body, and most of it will be discharged from the urine in the form of oxalic acid or calcium oxalate. This insoluble salt will accumulate in the body like a stone, causing kidney and urethral stones.

Mobility in soil: when released into soil, it may seep into groundwater and biodegrade.

Other adverse effects:-

14、 Delivery information

UN number: - un1760corrosive life

UN transport Name:-

Transport hazard classification: category 9 other hazardous substances

Packing category:-

Marine pollutants (yes / no): no

Special transportation methods and precautions:-

15、 Regulatory information

Applicable regulations:
1.Rules for labor safety and health facilities.
2.General rules of dangerous and harmful substances.
3.The allowable concentration standard of harmful substances in the air of labor working environment.
4.Road traffic safety rules.
5.Methods and facilities standards for storage, removal and disposal of industrial wastes.

16、 Other data

reference	MSDS database
Tabulator unit	Name: Dongguan Xiaoge Electronic Technology Co., Ltd

	Address / Tel: 1 / 2 / F, beside Sanxing Road, Fenghuang Middle Road, Shajiao community, Humen Town, Dongguan City	
Tabulator	Title: quality controller	Name (seal): Huang Huanwen
Date of tabulation	2020-12-01	
remarks	The symbol "-" in the above data indicates that there is no relevant data at present, while the symbol / "indicates that this field is not applicable to the substance	

， 安 全 資 料 表

版權 2021-01-10

First, chemical products and materials for business

Chemical name: PSM-800FSDM-A/SMH-800 liquid solid plate ink
Other names:
Use and restricted use of construction: flexible printed circuit board (PI/Cu), hand machine roof board
Name, address and address of the creator, entrant or supplier: Creator: Yueli Reachability Co., Ltd. Address: No.22 Jingjian Fourth Road, Guanyin District, Taoyuan City: 886-3-4836651
Urgent/true: 886-3-4836651, true: 886-3-4837487

Second, the hazard identification of resources and materials

Hazard classification of chemical products:
Health and environmental hazards: Acute toxicity (swallowing) 4, rot/skin irritation 2, heavy weight/eye irritation 2, skin Pass sensitive substance first, carcinogenic substance second, and hazardous substance second (acute toxicity).
Indication of content: Symbol number: Warning language: Warning hazard warning interest: Harmful to swallow Cause skin irritation Causing severe eye irritation may cause skin hypersensitivity and suspected carcinogenesis Toxic to aquatic organisms Hazard prevention measures: Put the container in a place with good ventilation far away from the high temperature Do not eat or drink when using Remove the blindfold/face mask immediately when your clothes are contaminated If you touch your eyes, wash them with plenty of water immediately, and then ask the mud to wear suitable gloves Do not inhale gas/gas/steam gas/gas before use Place it in the upper lock Do not place until you know all safety precautions Avoid releasing release in the environment
Other hazards:-

III. Composition identification of PSM-800FSDM-A/SMH-800

capital mixture:

Liquid solid plate ink PSM-800FSDM-A/SMH-800		
Chemical geology:		
Chinese and English names of hazardous components	Register number of Chemical Digest Service (CAS No.)	Degree or degree (percentage of components)
Oxygen acrylate oligmer Epoxy acrylate oligmer	28064-14-4	50%
Silicon dioxide Fused silica	7631-86-9	13%
Aromatic solution	64742-94-5	4%

Methyl dipropylene glycol	34590-94-8	4%
Carbon black	1333-86-4	3.5%
BaSO4 sulfate	13462-86-7	24%
Photoinitiator and the others	5495-84-1	1.5%

Fourth, first aid measures

First aid methods for the same road:

Inhalation: 1. Take self-protection measures before rescue.

2. Remove pollution sources or move patients to new places.

3. If a patient stops breathing, artificial respiration should be given immediately by the person who has been adalmed. If the heart stops, cardiopulmonary resuscitation should be given. When the patient inhales and swallows toxic substances, mouth-to-mouth artificial respiration should be used directly, and pocket masks and other medical equipment should be used for artificial respiration.

4. Maintain the patient's safety and normal temperature. 6. Treat the cure quickly.

Pi Mo: Wash the contaminated area with harmonious water for at least 20 minutes, and remove contaminated clothes, shoes and leather products before water. Eye touching: Immediately open the eyelids and wash the contaminated eyes with water for at least 20 minutes, and immediately take care of them.

Intake: 1. If the patient will be frustrated, or has been frustrated, he can feed anything.

2. It can induce vomiting and give 240-300ml of water.

3. If you vomit spontaneously, rinse your mouth and supply water repeatedly.

The most important diseases and harmful effects:-

Protection against first aid workers:-

Tips for doctors:-

V. Fire measures

Suitable for fire: chemical dry powder, wine foam, carbon dioxide, water, fire: water, water, foam water.

Special hazards that may be encountered during fire;

1. Its steam gas and decomposition products are burning and toxic.
2. Its steam gas is heavier than its empty gas, and it can spread to distant fire sources and give birth to tempering.
3. The combination of steam and big gas may lead to explosion.
4. When this object is indoors, outdoors or in sewers, it is in danger of steam explosion.

Special Fire Procedure:

1. In a safe distance from the place of fire, keep in the upwind position.
2. You can use water containers to disperse steam gas to wash the leakage and sparse the leakage, so as to protect the rescue staff.
3. Water in the flame of the container around, so that the container is cold, until the fire is cold. Keep the bottom of the container safe.
4. Poker or move all ignition sources.

Special protection of firefighters: Firefighters must wear air respirators, fire clothing and protection gloves.

VI. Leakage and management methods

Things people should pay attention to:

1. Restrict personnel from entering until the spillover area is completely cleaned up.
2. The work of cleaning up by the person who is negated.
3. Wear appropriate civil air defense.

Attention to matters in the environment:

1. Remove the ignition source.
2. Maintain ventilation in the leakage area.
3. Be in the upper wind and avoid going into the lower place.
4. Remove or separate burning and combustible materials under conditions that endanger the safety of people.
5. At least 100 to 200 meters away from the pollution source.

Cleaning method:

1. You can touch the leaked materials.

2. Avoid leakage entering sewers or dense spaces.
3. Where safety permits, prevent or reduce spills.
4. Block the leakage with soil, sand or similar and combustible objects that will respond to the leakage.
5. When there is a small amount of spill, it should be absorbed by the reaction with the leakage. Contaminated absorbed and discharged materials have the same model
6. Harmfulness must be placed in the appropriate container that is covered and indicated. Wash the spill area with water.
7. When there is a large amount of spill: fire fighting, emergency management and business response to seek help.

VII. Safe Location and Storage Methods

Place:
1. It is stored in a place where it is dry and ventilated, and avoids direct light and ignition source.
2. Far away things such as strong oxides, strong acids and water.
3. Use grounding, use the device without spark, and ventilate the wind system.
4. Store a small amount in the refrigerator, and use the explosion-proof refrigerator.
5. Department of police reports leaked outside the city.
6. It is necessary to separate the storage area from the work area, restrict people from entering and leaving the storage area, and show warnings.
7. Avoid collision, and the nearest fire system.
8. You can work alone, and another person needs to be on standby for rescue.
9. In the work area, use the containers that can be used to burn the liquid body, and all the barrels and slots should be grounded, and the containers must be connected to each other.
10. Use the smallest possible amount, and use a suitable ventilation system in the designated area.
11. The target indication container should be covered when in use.

Storage:
1. It is stored in a place where it is dry and ventilated, and avoids direct light and ignition source.
2. Store a small amount in the refrigerator, and use the explosion-proof refrigerator.
3. It is necessary to separate the storage area from the work area, restrict people from entering and leaving the storage area, and show warnings.
4. The target indication container should be covered when in use.

Eight, the preventive measures

Engineering control:
1. The wind system of the single use of the step to generate sparks and grounding.
2. The discharge port leads directly to the outside, and the important measures for protection are taken.
3. When using this object in large quantities, it may be necessary to install local gas and process dense.
4. Supply fully new and fresh air gas to supplement the air gas drawn out by filling and discharging the air gas system.

Control number:-
Average capacitance of eight small hours/average capacitance of short hours/maximum capacitance:-
Biological fingerprint:-

Civil air defense:

:: Breathing protection: 1. Chemical materials containing machine vapor poison cans or self-made breathing protection equipment.

2. Constant quantity type gas supply type breathing protection device, animation type breathing protection device containing machine steamed gas pot, mask containing machine steamed gas pot, comprehensive self-galvanizing breathing protection device, comprehensive gas supply type breathing protection device, and comprehensive chemical school poison breathing protection device containing machine steam poison pot. 3. Positive full-blown breathing protection equipment or positive full-blown gas-supplied breathing protection equipment with auxiliary positive self-blown breathing protection equipment.

4. There is a mask for steaming gas canister, and an escape type self-breathing protection tool.

Hand protection: Butyl rubber is the best, chlorinated polyethylene, polyvinyl acid, fluorinated cortex, butyl rubber/chloroprene rubber, fluorinated rubber, chloroprene rubber/natural rubber galaxy cover, fluorinated cortex/chloroprene rubber are also good anti-scorching gloves.

Eye protection: 1. Anti-chemical safety eye protection.

2. Full cover.

3. Don't wear shaped eyes.

1. Work shoes and body clothes.

2. There should be a bath/wash in the work area.

The measures for living:

1. Remove contaminated clothes quickly after work, and then wear them after washing them.

2. The work place is forbidden to smoke cigarettes or eat. 3. After taking care of this thing, you must wash your hands. 4. Keep the property clean.

IX. Physical and Chemical Geology

Outside (physical state, color, etc.): black cream	Gas flavor: bad smell
Olfactory value:-	Melting level:-25 ℃
PH value:-	Boiling/boiling: 218-219 ℃
Combustibility (solid and gas):-	Fire: > 75 ℃
Decomposition temperature:-	The method of wearing a cup: () carrying a cup (V) wearing a cup
Spontaneous combustion temperature: spontaneous combustion	Explosion boundary:-
Steaming gas:-	Steaming density: 6.07
Density: 1.24 ~ 1.26 (water = 1)	Solubility: Slightly soluble in water
Octanol/water partition number (log Kow):-	Dispersion rate:-

X. Stability and Reaction

Stability: Stability under sealed dry container.
Possible hazard response under special conditions:-
Types to be avoided: leakage, flame and other ignition sources.
Things to avoid: acid, oxidation
Hazardous decomposition: carbon monoxide

XI. Toxic Materials

The road: leather, inhalation, eyes, food
Symptoms: irritation, drowsiness, dizziness, tiredness, pain, nausea, difficulty breathing and
Acute toxicity: Inhalation: 1. Steaming gas will irritate nose, throat and lungs. Pi Fou: 1. Liquid body or solution will cause heavy irritation and burning pain. 2. Steaming gas can cause irritation. 3. After being picked up by the skin, the liquid will be absorbed to the poisoned amount. Eyes: 1. Steaming gas will irritate eyes and stimulate them. 2. Liquid body will cause heavy burning and injury to eyes. Intake: 1. It will cause bright local irritation to the mouth and digestive tract.
Chronic toxicity or long-term toxicity:-

Twelve, raw materials

Raw toxicity:-
Persistence and degradation: Avoid entering the water source inlet and waterway, which is harmful to aquatic organisms.
Bioaccumulability:-
Reactionality in soil:-
Other good effects:-

XIII. Methods of abandoning and abandoning places

Discarding method: 1. Examining the principle of phase method. 2. According to the pieces of the store to be disposed of waste materials. 3. Specific incineration or burial can be used.

Fourteen, Dictate to send materials

Lian He Guo Bian No.:-

版權 2021-01-10

The name of the joint country is:-
Classification of the hazards of Dirk: It is judged as ordinary goods according to Fujian Commercial Report 0128227
Packaging and fitting: It can be arranged according to ordinary goods
Marine pollutants (yes/no): no
Special delivery methods and precautions:-

XV. French Materials

Suitable usage: 1. If you work safely, you will be able to apply it 2. Road traffic safety rules 3. Methods and standards for the storage and removal of waste materials 4. Harmful academic products and general knowledge 5. What you can do in your work, what you can do, and what you can do

XVI. Other materials

Take part in the text	1. RTECS Materials, TOMES PLUS CD-ROM, Vol. 41, 1999 2. HSDB Materials, TOMES PLUS CD-ROM, Vol. 41, 1999	
Superficial site	Mingjia: Youli Lian Lian Co., Ltd.	
	Address/: No.22, Jingjian Fourth Road, Guanyin District, Taoyuan City: 886-3-4836651	
Table person	Calling for: the principle of science and technology	Name (Seal): Huang Zhihui
Table date	2021.01 1.10	
Per	Among the above-mentioned materials, "-" means that there is no related materials at present, while the symbol number "/" means that this person is compatible with the material and is suitable for use	

The above-mentioned materials are provided by our company, which is correct for the above-mentioned materials, but it is still difficult to avoid them. The materials and materials of each project are only for reference, and users should judge their availability according to their corresponding needs.

JIU JIANG
Flex Co., Ltd
1210 Qianjin Road(E), Jiujiang Jiangxi,China 332006
Tel: 86-792-8358899, Fax: 86-792-8355803

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

1.1 Material Name: Flexible Copper-Clad Polyimide Laminates
1.2 Part Number: LPI-HF
1.3 Use of Material: Printed Circuit Boards
1.4 Date of Prepared: April 22nd, 2021
1.5 Company Identification: Jiu Jiang Flex Co., Ltd.
1210Qianjin Road (E) Jiujiang, Jiangxi, China 332006
1.6 Emergency Telephone Number: 86-792-8358899
1.7 Telephone Number for Information: 86-792-8358899, 8355813

SECTION 2 COMPOSITION/INFORMATION ON INGREDIENTS

Composition / substance		CAS#	%
PI	polyimide	25038-81-7	2.93~28.11
Adhesive	Epoxy resin	25036-25-3	2.42~6.81
	Flame Retardant (additive type)	225789-38-8	0.49~1.36
	Rubber	9003-18-3	1.45~3.99
Copper foil	Copper	7440-50-8	92.66~59.72

SECTION 3 HAZARDOUS IDENTIFICATION

Dust, soot, combustion gases produced when burning, of inhaled, ingested or absorbed through skin it will be harmful or irritating to the eyes, skin, mucous membrane, respiratory system, allergies can be caused to skin, flammable irritating and sensitive.

SECTION 4 FIRST-AID MEASURES (on Dust)

Inhalation:
Remove to fresh air. Obtain medical attention if symptoms persist.

Eye Contact:
Flush immediately with large amounts of water. Do not rub eyes. Obtain medical attention if symptoms persist.

Skin Contact:
Wash area of contact thoroughly with soap and water. Do not rub or scratch. Obtain medical attention if symptoms persist.

Ingestion: Drinking water as much as possible, emetic, and see doctor.

1210 Qianjin Road(E), Jiujiang Jiangxi,China 332006
Tel: 86-792-8358899, Fax: 86-792-8355803

SECTION 5 FIRE FIGHTING MEASURES

Extinguishing Agents

Following extinguishing media can be used:
Carbon dioxide extinguisher
Dry powder fire extinguisher
Water Pump
Foam fire extinguisher

Hazards of Unusual burning and Explosion:

The material produces carbon monoxide, carbon dioxide, nitrogen, oxides of nitrogen, smoke and dust when extremely high temperature or burning.

Personal Protective Equipment

As in any burning, wear self-contained breathing apparatus and full protective gear.

Upper limit of Flammability: not ascertained

SECTION 6 EMERGENCY HANDLING OF LEAKAGE

Emergency handling:

Block the leakage area to avoid dust flying and wear protective equipment, use vacuum cleaner to clean the leakage.

SECTION 7 HANDLING AND STORAGE

Handling: Wear cotton gloves to protect product damage and hand lacerated.

Storage conditions

The material should be stored in dry, ambient temperature wrapped with PE film.

Environment: Keep away from heat, ignition sources, and direct sunlight.

Other conditions: Keep cartons tightly closed when not in use.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Respiratory protection:

No general requirements. If the occurrence of dust, gas or smoke processing or processing, is stimulating to employees, to use NIOSH/MSHA approved respiratory protection measures. Engineering control should be excluded from the need for respiratory support.

Ventilation:

Once air exhaust exposure exceeds limits, or visible smoke, dust, exhaust gas, the ventilation at site should be accompanied by all the heat process at the same time.

Mechanical operations:

Optimize and follow good industrial operation as possible as you can.

Eye Contact:

With eye-glasses on during all process

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance	PI film Copper-Clad Laminate with adhesive
Physical State:	solid
PH:	Not Applicable
Melting point:	no data
Relative density (water =1):	more than 1
Boiling point:	no data
The relative vapor density (air =1):	more than 1
Saturated vapor pressure (kPa):	Not Applicable
Heat of combustion (kJ/mol):	no data
The critical temperature (c):	Not Applicable
The critical pressure (MPa):	Not Applicable
The octanol / water partition coefficient of numerical:	Not Applicable
Flash point（℃):	Not Applicable
Upper explosive limit% (V/V):	Not Applicable
Ignition temperature (c):	no data
The lower limit of explosion% (V/V):	Not Applicable
Solubility:	insoluble
Application:	used for making printed circuit board

SECTION 10 STABILITY AND REACTIVITY

Stability:

Storage for one year at 5℃ to 30℃ and RH less than 75%

Conditions to Avoid:

High Humidity, direct sunlight,

The copper side may have violent reaction with followings:

Acetylene, ammonium nitrate, bromide, chlorate, iodic acid, chlorine, ClF_3, $Pb(N_3)_2$, (Cl_2+OF_2), ethylene oxide, fluoride, hydrogen peroxide, nitric acid hydrazide, hydrazoic acid, H_2S, K_2O_2, NaN_3, Na_2O_2.

SECTION 11 TOXICOLOGICAL INFORMATION

Sensitization: Long time skin contact may cause dermatitis

Acute Poisoning: Inhalation of dust may cause thirst, fever, headache, weakness, symptom of respiratory disorders.

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Tel: 86-792-8358899, Fax: 86-792-8355803

SECTION 12 ECOLOGICAL INFORMATION

Normal condition: No big influence may caused to ecology.
Waste Disposal Method
To dispose based on local, state or national laws.
Tank treatment: Not applicable.

SECTION 13 DISPOSAL CONSIDERATION

Hazardous wastage: NO.
Waste Disposal Method
To bury or burn at specified place based on national laws.

SECTION 14 TRANSPORTATION INFORMATION

No special regulation on this product for domestic or international transportation.

SECTION 15 REGULATORY INFORMATION

Must be complied with domestic or local regulation

SECTION 16 REGULATORY INFORMATION

14.1 INTERNATIONAL REGULATIONS:
EU Directive 2011/65/EU (RoHS): Compliant

SECTION 17 OTHER INFORMATION

Issued by: QC Department of Jiu Jiang Flex Co., Ltd
Disclaimer:
The data sheet information is true and accurate, but all statements and recommendations do not contain any guarantee. The consequence of the material shall be from practice. This report does not include all the circumstances that the user may encounter during operation. Each aspect of the operation may be increased or decreased during operation. All health and safety information contained in this report shall be submitted to you employees and customers. Users are responsible to take appropriate measures in practical operations.

CHUNG YU INDUSTRY CORPORATION

Material Safety Data Sheet

Section 1： Chemical Product and Company Identification

Product name	Thermal curable two-component marking ink
Other means of identification	ZSR-150 ZM-400WF
Recommended use of the chemical and restrictions on use	Use in PCB fabrication.
Manufacturer/Supplier identification	CHUNG YU INDUSTRY COPORATION
Manufacturer/Supplier address	618 Yen-Ping Rd., sec. 3, Ping-Jeng, Tao-Yuan, Taiwan
Emergency telephone No.	(886-3)4641205
FAX No.	(886-3)4644839

Section 2： Hazards Identification Information

Hazard classifications of the product	Inflammable liquids(II),Carcinogens, (II), Inhalation of hazardous substances (I)
Label elements	 Hazard symbols: Fire Caution catchwords: Danger Hazard massages: Inflammable liquids and vapor Harmful to swallow Skin irritation Eye irritation
Other hazards	—

Section 3： Composition, Information on Ingredients

Mixture：

Chemical name	Concentration(% of contents)	CAS. NO.
Epoxy resin	50	25085-99-8
Barium sulfate	15	7727-43-7
Titanium dioxide	30	13463-67-7
Naphtha	5	8030-30-6

Section 4 ： First-aid Measures

The first-aid measures for different exposure routes:	
Eyes contact	Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids.
Skin contact	Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes.
Swallow	Do not induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.
Inhalation	Remove from exposure to fresh air immediately.
The most important symptoms and hazardous effects	Headache, nausea
Notes to Physicians	Please provide the MSDS for physicians.

Section 5： Fire-fighting Measures

Suitable fire extinguishing media	Chemical dry powders, chemical foam, carbon dioxide
General information	As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.
Specific fire-fighting methods	It’s not suitable to use water extinguish.

Section 6： Accidental Release Measures

Person-related precautionary measures	Do not inhale vapors / aerosols. Ensure supply of fresh air in enclosed rooms.
Environmental-protection measures	Do not allow to enter sewerage system.
Procedures for cleaning / absorption	Take up with liquid-absorbent material. Forward for disposal. Clean up affected area

Section 7： Safe Handling and Storage Measures

Handling	Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation.
Storage	Store in a cool(15～25℃), dry place. Keep container closed when not in use.

Section 8： Exposure Controls Measures

Engineering controls	Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits. Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels.
Control parameters	

Term	8 hours time weighted averagw exposure limits TWA	Short-term exposure limits STEL	Maximum limits CEILING	Biological standards BEIs
Solvent	100ppm	125ppm	—	—

Personal protective equipment	Eye protection: Wear safety glasses and chemical goggles if splashing is possible. Skin protection: Wear appropriate protective gloves and clothing to prevent skin exposure. Clothing: Wear appropriate protective clothing to minimize contact with skin. Respirators: Wear a NIOSH/MSHA or European Standard EN 149 approved full-facepiece airline respirator in the positive pressure mode with emergency escape provisions.

Section 9： Physical and Chemical Properties

Physical state：paste	Color：white
Odor threshold：—	Odor：slightly pungent
pH value：—	Melting point：—
Decomposition temperature：—	Boiling point：110-190℃ (solvent)
Flammability(solid, gas)：—	Flash point：38-43℃ (solvent) Test methods：—
Autoignition temperature：—	
Vapor pressure：<5 mmHg @ 25℃ (solvent)	Explosion limits：—
Specific gravity/Density：1.45～1.55 g/cm^3 (water=1)	Solubility in water：insoluble

Section 10： Stability and Reactivity

Chemical stability	Stable under normal temperatures and pressures.
Conditions to avoid	Fire.
Incompatibilities with other materials	Strong oxidants.
Hazardous decomposition products	Irritating and toxic fumes and gases.
Hazardous polymerization	Has not been reported.

Section 11： Toxicological Information

Information on the likely routes of exposure	Skins, swallow, inhale, eyes
Symptoms	Nausea, vertigo, irritation
Acute toxicity	Skins: Slight irritation Swallow: Nausea, vomit, and the other symptoms same as inhale Inhale: Cause the respiratory tract irritation, nausea, vomit, headache Eyes: The vapor cause eyes irritation LD50(solvent): >5000mg/kg (mouse, swallow) LC50:－
Further information	Further hazardous properties cannot be excluded. The product should be handled with the usual when dealing with chemicals

Section 12： Ecological Information

Ecotoxic effect	Quantitative data on the ecologic effect of this product are not available.
Further ecologic data	No ecological problems are to be expected when the product is handled and due care and attention.

Section 13 - Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.

Section 14 - Transport Information

1. United Nation number (UN No.): 1866
2. UN proper shipping name: －
3. Transport hazard classes: 3
4. Packing group:－
5. Marine pollutant (Yes/No): No
6. Specific transport measures and precautionary conditions: －

Section 15 - Regulatory Information

1. European / International Regulations：European labeling in accordance with EC Directives.
2. Other using condition should follow local regulations.

Section 16 - Additional Information

Organization that prepared the MSDS	Name: R&D	TEL: (886-3)4641205	
	Address: 618 Yen-Ping Rd., sec. 3, Ping-Jeng, Tao-Yuan, Taiwan		
Person who prepared the MSDS	Job: manager	Name: Wan-Hua Lee	
Date the MSDS was prepared	2018/12/20		

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Material Safety Data Sheet

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This material safety data sheet (MSDS) is provided as a courtesy in response to a customer request. This product is not regulated under, and a MSDS is not required for this product by the OSHA Hazard Communication Standard (29 CFR 1910.1200) because, when used as recommended or under ordinary conditions, it should not present a health and safety hazard. However, use or processing of the product not in accordance with the product's recommendations or not under ordinary conditions may affect the performance of the product and may present potential health and safety hazards.

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: 3M(TM) Laminating Adhesives 9471LE, 9472LE, 9671LE, 9672LE, 9653LE, 9453LE
MANUFACTURER: 3M
DIVISION: Industrial Adhesives and Tapes
ADDRESS: 3M Center
St. Paul, MN 55144-1000

EMERGENCY PHONE: 1-800-364-3577 or (651) 737-6501 (24 hours)

Issue Date: 06/20/2003
Supercedes Date: 05/22/2001

Document Group: 08-9111-9

Product Use:
Specific Use: Laminating Adhesive

SECTION 2: INGREDIENTS

Ingredient	C.A.S. No.	% by Wt
TACKIFIED ACRYLATE POLYMER	None	100

SECTION 3: HAZARDS IDENTIFICATION

3.1 EMERGENCY OVERVIEW

Specific Physical Form: Roll of Tape
Odor, Color, Grade: Tan, Acrylate odor when unrolled.
General Physical Form: Solid
Immediate health, physical, and environmental hazards: This product, when used under reasonable conditions and in accordance with the 3M directions for use, should not present a health hazard. However, use or processing of the product in a manner not in accordance with the product's directions for use may affect the performance of the product and may present potential health and safety hazards.

3.2 POTENTIAL HEALTH EFFECTS

Eye Contact:
No health effects are expected.

Skin Contact:
No health effects are expected.

Inhalation:
No health effects are expected. This product may have a characteristic odor; however, no adverse health effects are anticipated.

Ingestion:
No health effects are expected.

SECTION 4: FIRST AID MEASURES

4.1 FIRST AID PROCEDURES

The following first aid recommendations are based on an assumption that appropriate personal and industrial hygiene practices are followed.

Eye Contact: No need for first aid is anticipated.

Skin Contact: No need for first aid is anticipated.

Inhalation: No need for first aid is anticipated.

If Swallowed: No need for first aid is anticipated.

SECTION 5: FIRE FIGHTING MEASURES

5.1 FLAMMABLE PROPERTIES

Autoignition temperature	*No Data Available*
Flash Point	*Not Applicable*
Flammable Limits - LEL	*Not Applicable*
Flammable Limits - UEL	*Not Applicable*

5.2 EXTINGUISHING MEDIA
Use fire extinguishers with class B extinguishing agents (e.g., dry chemical, carbon dioxide).

5.3 PROTECTION OF FIRE FIGHTERS

Special Fire Fighting Procedures: Wear full protective clothing, including helmet, self-contained, positive pressure or pressure demand breathing apparatus, bunker coat and pants, bands around arms, waist and legs, face mask, and protective covering for exposed areas of the head.

Unusual Fire and Explosion Hazards: No unusual fire or explosion hazards are anticipated.

Note: See STABILITY AND REACTIVITY (SECTION 10) for hazardous combustion and thermal decomposition information.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Accidental Release Measures: Not applicable.

SECTION 7: HANDLING AND STORAGE

7.1 HANDLING

Avoid prolonged or repeated skin contact. This product is considered to be an article which does not release or otherwise result in exposure to a hazardous chemical under normal use conditions.

7.2 STORAGE

Not applicable.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 ENGINEERING CONTROLS

Not applicable.

8.2 PERSONAL PROTECTIVE EQUIPMENT (PPE)

8.2.1 Eye/Face Protection

Avoid eye contact.

8.2.2 Skin Protection

Avoid prolonged or repeated skin contact. Gloves not normally required.

8.2.3 Respiratory Protection

Under normal use conditions, airborne exposures are not expected to be significant enough to require respiratory protection.

8.2.4 Prevention of Swallowing

Not applicable.

8.3 EXPOSURE GUIDELINES

None Established

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Specific Physical Form:	Roll of Tape
Odor, Color, Grade:	Tan, Acrylate odor when unrolled.
General Physical Form:	Solid
Autoignition temperature	*No Data Available*
Flash Point	*Not Applicable*
Flammable Limits - LEL	*Not Applicable*
Flammable Limits - UEL	*Not Applicable*
Boiling point	*Not Applicable*

Vapor Density	*Not Applicable*
Vapor Pressure	*Not Applicable*
Specific Gravity	Approximately 1.01 [*Ref Std:* WATER=1]
pH	*Not Applicable*
Melting point	*No Data Available*
Solubility in Water	Nil
Evaporation rate	*Not Applicable*
Volatile Organic Compounds	*No Data Available*
Percent volatile	*No Data Available*
VOC Less H2O & Exempt Solvents	*No Data Available*
Viscosity	*Not Applicable*

SECTION 10: STABILITY AND REACTIVITY

Stability: Stable.

Materials and Conditions to Avoid: None known

Hazardous Polymerization: Hazardous polymerization will not occur.

Hazardous Decomposition or By-Products

Substance	Condition
Hydrocarbons	During Combustion
Carbon monoxide	During Combustion
Carbon dioxide	During Combustion

Hazardous Decomposition: Under recommended usage conditions, hazardous decomposition products are not expected. Hazardous decomposition products may occur as a result of oxidation, heating, or reaction with another material.

SECTION 11: TOXICOLOGICAL INFORMATION

Please contact the address listed on the first page of the MSDS for Toxicological Information on this material and/or its components.

SECTION 12: ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION

Not applicable.

CHEMICAL FATE INFORMATION

Not applicable.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste Disposal Method: Dispose of waste product in a sanitary landfill. As a disposal alternative, incinerate in an industrial or

commercial facility.

Since regulations vary, consult applicable regulations or authorities before disposal.

SECTION 14:TRANSPORT INFORMATION

Please contact the emergency numbers listed on the first page of the MSDS for Transportation Information for this material.

SECTION 15: REGULATORY INFORMATION

US FEDERAL REGULATIONS

Contact 3M for more information.

311/312 Hazard Categories:
Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No Immediate Hazard - No Delayed Hazard - No

STATE REGULATIONS

Contact 3M for more information.

CHEMICAL INVENTORIES

This product is an article as defined by TSCA regulations, and is exempt from TSCA Inventory listing requirements.

Contact 3M for more information.

INTERNATIONAL REGULATIONS

Contact 3M for more information.

This MSDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.

SECTION 16: OTHER INFORMATION

NFPA Hazard Classification
Health: 0 **Flammability:** 1 **Reactivity:** 0 **Special Hazards:** None

National Fire Protection Association (NFPA) hazard ratings are designed for use by emergency response personnel to address the hazards that are presented by short-term, acute exposure to a material under conditions of fire, spill, or similar emergencies. Hazard ratings are primarily based on the inherent physical and toxic properties of the material but also include the toxic properties of combustion or decomposition products that are known to be generated in significant quantities.

Reason for Reissue: The MSDS has been revised because 3M has adopted the 16-section ANSI/ISO format. The potential hazards of the product have not changed. We encourage you to reread the MSDS and review the information.

DISCLAIMER: The information in this Material Safety Data Sheet (MSDS) is believed to be correct as of the date issued. 3M MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR COURSE OF PERFORMANCE OR USAGE OF TRADE. User is responsible for determining whether the 3M product is fit for a particular purpose and suitable for user's method of use or application. Given the variety of factors that can affect the use and application of a 3M product, some of which are uniquely within the user's knowledge and control, it is essential that the user evaluate the 3M product to determine whether it is fit for a particular purpose and suitable for user's method of use or application.

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3M MSDSs are available at www.3M.com

江阴凯博通信科技有限公司
JIANGYIN KAIBO COMMUNICATION TECHNOLOGY CO.,LTD.
Material Safety Data Sheet（物質安全資料表）

一、　物品与厂商资料
物品名称：同轴高频线
物品编号：KB113/50 系列
制造商或供货商名称、地址：江阴市凯博通信科技有限公司/江苏省江阴市澄江镇梅园大街 391 号
紧急联络电话/传真电话：0510-86070001/86070020
二、　成分辨识资料
纯物质：
中英文名称：聚全氟乙丙烯 FLUORINATED PROPYLENE ETHYLENE/镀锡线 TINNED COPPER/镀银铜线/Silver plated Copper
同义名称：FEP/TX/SC
危害物质成分(成分百分比）：无

危害物质：

危害物质	浓度或浓度范围（单位：ppm）	
铅及其化合物 Pb	≤90	
镉及其化合物 Cd	≤75	
汞及其化合物 Hg	≤1000	
六价铬及化合物	≤1000	
卤素	氯 Cl≤900	氯 Cl+溴 Br≤1500
	溴 Br≤900	
SVHC15 种物质	禁止使用	

三、危害辨识数据

最重要危害效应	健康危害效应：在 260℃ 以上，可能会有吸入分解气体的危险.一定要安装排气装置.
	环境影响：要按废弃物处理及清扫法律法规处理,绝对不可燃烧.
	物理性及化学性危害：物理化学性能及其稳定,不易降解,不得擅自填埋 .
	特殊危害：　无
主要症状：　对人的神经系统产生损害	
物品危害分类：大气和水源	

四、急救措施

不同暴露途径之急救方法：
・吸入：到空气流通处换气.
・皮肤接触：无
・眼睛接触：无
・食入：　不消化,排出.

最重要症状及危害效应：无
对急救人员之防护：对流换气
对医师之提示： 吸氧

五、灭火措施

适用灭火剂： 通用
灭火时可能遭遇之特殊危害： 避免分解气体吸入
特殊灭火程序：无
消防人员之特殊防护设备：防毒面罩

六、泄漏处理方法

个人应注意事项：粉状树脂
环境注意事项： 不可填埋
清理方法：要按废弃物处理及清扫法律法规处理,绝对不可燃烧.

七、安全处置与储存方法

处置：避免与高温和火源接触.
储存：通风干燥处.

八、暴露预防措施

工程控制：无
控制参数： · 八小时日时量平均容许浓度/短时间时量平均容许浓度/最高容许浓度： · 生物指标：
个人防护设备： · 呼吸防护：安装排气装置 · 手部防护：无 · 眼睛防护：无 · 皮肤及身体防护：无
卫生措施：应将衣服上附着的灰尘抖落,手脸洗净,不要让其附着于香烟上.

九、物理及化学性质

物质状态：固体	形状：透明颗粒
颜色：透明	气味： 无
pH 值： 7	沸点/沸点范围： /
分解温度： 360℃	闪火点： /
自燃温度： /	爆炸界限： /
蒸气压： /	蒸气密度： /
密度： 2.2	溶解度： /

十、安定性及反应性

安定性：很稳定
特殊状况下可能之危害反应：高温或燃烧分解气体对人体神经系统的损害.
应避免之状况：绝对不可燃烧.

应避免之物质：金属钠及其强酸的混合物 .
危害分解物： 气体及粉尘.

十一、毒性资料

急毒性：/
局部效应：/
致敏感性： /
慢毒性或长期毒性： /
特殊效应： /

十二、生态资料

可能之环境影响/环境流布：不降解,禁填埋

十三、废弃处置方法

废弃处置方法：按废弃物处理及清扫法律法规要求送专业资质处理公司处置.

十四、运送资料

国际运送规定：/
联合国编号： /
国内运送规定： 无
特殊运送方法及注意事项：无

十五、法规资料

适用法规：遵循欧盟 REACH 法规相关要求。

十六、其它数据

参考文献	杜邦产品说明/SONY 限用物资标准
制窗体位	名称：江阴凯博通信科技有限公司
	地址/电话：江阴市**城东街道东定路83号/0510-86070012**
制 表 人	姓名(签章)：**董英畅**
制表日期	2023/11/12

物质安全资料表

MSDS C5100,C5191,C5210,C5240

物质安全资料表编号： MCL001	改版日期：02-15-2015
版次：4	前次改版：02-20-2008

1. 物质供应商资料

物品中（英）文名称：	磷青銅(PHOSPHOR BRONZE ALLOYS)		
物品代码：	JIS C5100,C5191,C5210,C5240		
化学名称：	铜(Cu)－锡(Sn)金属合金		
类别：	铜金属合金		
制造商或供应商名称：	福建紫金铜业有限公司		
制造商或供应商地址：	福建省龙岩市上杭县南岗开发区		
制造商或供应商电话：	0597-3960633	传真：	0597-3833128
制造商或供应商网址：	www.fjzjty.com		
紧急联络电话：	0597-3960600		

2.成品成分

	CAS编号	化学名称	重量比例%
C5100	**7440-50-8**	铜(Cu)	>93.65
	7440-31-5	锡(Sn)	4.5~5.5
	7723-14-0	磷(P)	0.03~0.35

	CAS编号	化学名称	重量比例%
C5191	**7440-50-8**	铜(Cu)	>92.15
	7440-31-5	锡(Sn)	5.5~7.0
	7723-14-0	磷(P)	0.03~0.35

	CAS编号	化学名称	重量比例%
C5210	**7440-50-8**	铜(Cu)	>90.0
	7440-31-5	锡(Sn)	7.0~9.0
	7723-14-0	磷(P)	0.03~0.35
	7440-66-6	锌(Zn)	<0.20
	7439-92-1	铅(Pb)	<0.05
	7439-89-6	铁(Fe)	<0.10

	CAS编号	化学名称	重量比例%
C5240	**7440-50-8**	铜(Cu)	>90.15
	7440-31-5	锡(Sn)	9 ~11
	7723-14-0	磷(P)	0.03~0.35

OSHA 管理状态 ：在固体时不具危害性。其粉尘及燻烟对肺脏、血液、肾脏具有致癌、刺激性。反复产生之毒性及神经性毒素

OHSA：本合金产品在固体时不具危害性。其粉尘及燻烟具有危害性。

（美国）职业安全卫生署OSHA

3. 危害辨识资料

警告！ 暴露于粉尘及燻烟的工作环境下，对于眼睛、呼吸系统、皮肤会造成刺激伤害。其含有金属可能对血液、肾脏产生反复性及神经性之影响，也可能致癌。必须保持足够且良好之通风。避免直接接触眼睛、皮肤及衣物。佩戴保护器具，包括护目镜、适当衣物，必须要保证全部身体。身体及衣物被接触之部位，必须彻底清洗干净。	
种类的名称：	铜、锡之金属混合物。
危险标识类别：	金属粉尘或燻烟将对皮肤、眼睛造成刺激性且对肺具有毒性，但金属合金本身不具危害性。
HMIS 危害级数（粉尘及燻烟）：	健康 ：2 ；可燃性：0 （0=低 、4=极高）； 物性危害：无
IDLH 对生命或健康有立即性危害浓度值	IDLH(3/1/95)无本金属立即性危险浓度数值 。 铜(Cu)粉尘或燻烟、铅 (Pb)、锡(Sn)：100 mg / m^3 磷(P)：5 mg/m^3 氧化铁（Fe）粉尘或燻烟 ：2500 mg / m^3 氧化锌 ：500 mg / m^3

Hazardous Materials Identification System (HMIS)

严重症状：

眼睛：其粉尘或燻烟皆具刺激性，会引起红肿及疼痛。经常暴露于此环境时，可能导致结膜炎。

皮肤：此物质不会经由皮肤渗入体内被吸收。但接触其粉尘时，皮肤有可能会引起轻微刺激而出现红肿现象。

吸入：吸入人体是有害的。吸入高浓度粉尘或燻烟可能会导致剧烈呼吸、鼻刺激、咳嗽、呼吸困难。吸入高浓度铜金属粉尘或燻烟也可能出现呕心、呕吐及胃痛现象。金属燻烟可能引起类似流行性感冒（flu-like)症状之金属燻烟热；其症状包括喉咙不适、呼吸困难、咳嗽、哮喘、呕吐、头痛、发冷、发热、肌痛、虚弱、昏睡、流汗、关节痛。这些症状通常会在24小时后消失，但也有可能更长时间。

食入 ：大量食入粉尘时，可能引起呕心、腹泻及胃痛现象。

慢性影响：皮肤长期或者重复性接触其粉尘时可能引起剧烈刺激或皮肤炎。长期或者重复性吸入其粉尘或燻烟会导致更剧烈刺激。慢性暴露于铅中会引起人体肾脏损害、贫血症、复发性及成长性影响、永久性神经系统损害。

4.急救措施

对于粉尘及燻烟危害：

眼睛接触：	以大量清净水冲洗上下眼睛内部（至少15分钟），若眼睛被刺激不适者，立即送医院检查
皮肤接触：	以清水清洗干净。衣物被接触之部位，必须彻底清洗干净后才能再穿戴。若仍有皮肤发生刺激、出疹现象或情况持续、复发时送至医院诊疗。
吸入时：	送至通风良好较阴凉处休息，以毛巾保暖，严重者迅速送医院检查诊断。
食入时：	大量喝水并催吐，迅速送医院检查

医疗提示：对于本产品组成之元素物质并无特殊解毒剂可供使用。必须视不同症状给予适当治疗 。

5.火炎及爆炸危害资料

燃烧性资料 ：

爆炸性：	无
可燃性：	无
燃烧性：	无
闪火点：	不适用
自燃性：	不适用

灭火剂 ：

小区域之材料粉末起火时，可适用干沙、干石灰粉、食盐或苏打粉给予关熄。其他周边处起火时需以适当灭火器灭火。

意外及爆炸危害：

注意粉尘可能导致爆炸或产生可燃性气体。

6.泄露的处置

本产品在加工中产生粉尘时，有可能产生爆炸危害，必须将火源移除。也惟有粉尘型态时才可能产生泄露，所以必须装设通风设备及集尘装置过滤空气中之粉尘，以降低其粉尘浓度。

7.取用及储运方式

取用注意事项：

板带产品之端面易割伤皮肤应小心取用。
切削加工时会产生粉尘应小心眼睛、皮肤及呼吸应佩戴保护器具。
小心粉尘不可泄露至空气中。
需注意产品有翻到之危险性易造成压伤，吊运时要十分注意。
打包带切除时，小心其末端会弹起，对人员之身体、皮肤及眼睛造成割伤。
衣物或器具上之粉尘以水洗或HEPA吸入器清洗，不可用拍打或其他方式处理。

储存条件 ：

食储最高容许温度：无 避免放置于潮湿或酸/碱性物质或酸/碱性气体之场所

8. 人员暴露防设措施

CAS 编号	暴露标准：	OSHA(PEL)	ACGIH(TLV)
铜(Cu) 7440-50-8	燻烟	0.1 mg/m^3	0.2 mg/m^3
	粉尘及雾状	1 mg/m^3	1 mg/m^3
锡(Sn) 7440-31-5	粉状	2 mg/m^3	2 mg/m^3
磷(P) 7723-14-0	-	0.1 mg/m^3	0.1 mg/m^3
锌(Zn) 7440-66-6	-	无资料	无资料
铅(Pb) 7439-92-1	粉尘及燻烟	0.05 mg/m^3	0.05 mg/m^3
铁(Fe) 7439-89-6	-	无资料	无资料
本产品材料若经加热会产生燻烟，氧化锌燻烟可能形成。 OSHA(PEL)以及 ACGIH(TLV)对氧化锌燻烟之限制值为 5 mg/m^3			

呼吸防设：	一般情况下不需佩戴口罩。但当超过上述PEL/TLV标准值时必须佩戴NIOSH认证之全罩或半罩式HEPA滤心防口罩。
通风防设：	工作场所中，若是会产生燻烟及粉尘时，必须要有通风设备装置及集尘装置，且工作中不可饮食及抽烟
眼睛及脸部防设：	需要佩戴护目镜。
皮肤防设：	作业时应穿着适当之工作服，安全鞋及防护手套，以避免皮肤与材料直接接触并防止割伤。

（美国）职业安全卫生署OSHA(Occupational Safety and Health Administration)

（美国）国家职业安全卫生研究所NIOSH(National Institute for Occupational Safety and Health)

立即对生命或健康有危险 IDLH(Immediately Dangerous to Life or Health)

时量平均浓度 TWA(Time Weighted Average)；

容许暴露浓度值PEL(Permissible Exposure Limit)

9. 物理及化学性质

外观：	浅红色光泽的固态金属
熔点：	C5100(950~1060℃),C5191(900~1045℃), C5210(870~1030℃),C5240(840~1020℃)
沸点：	无资料
比重：	C5100(8.86),C5191(8.83), C5210(8.80),C5240(8.7)
蒸气压：	不适用
溶解度：	不适用
PH 值25℃：	不适用

10. 稳定性及活性资料

稳定性	在正常一般室温及大气下为稳定性物质，非活性物质。
应避免之状况	遭受机械撞击或通电时并不会产生化性反应。
应避免之材料	氯 ：与金属黄铜、铜细分应形成剧烈或爆炸性反应。 乙炔 ：与黄铜形成爆炸性化合物。
危害之分解物	当加热至分解温度时，会产生金属氧化物和金属燻烟。有可能引起类似流行性感冒（flu-like）症状之金属燻烟热。
危害之聚合反应	无。

11. 毒性资料

潜在之暴露途径：

粉尘：食入、皮肤接触、吸入、眼睛接触。
烟燻：吸入、眼睛接触。
本合金产品不具毒性。

动物急毒性资料：动物半致死剂量 (LD_{50})及浓度(LC_{50})

针对本合金产品之粉尘或燻烟	铜（Cu）	锡（Sn）	磷（P）	锌（Zn）	铅（Pb）	铁（Fe）
口服 (LD_{50})	3.5mg/Kg(鼠，腹腔内)	无资料	无资料	无资料	无资料	30mg/Kg(鼠)
皮肤 (LD_{50})	375mg/Kg(兔，皮下注射)	无资料	无资料	无资料	无资料	无资料
吸入 (LC_{50})	无资料	无资料	无资料	无资料	无资料	无资料

亚慢性及慢性毒性：本合金产品不具毒性。铅对实验室中动物之血液、肾脏及神经系统会造成损害。

致癌性：本合金产品尚未被报告具致癌性。铅被 IARC(International Agency for Research on Cancer) 列入对人头可能致癌，属2B类

致基因突变型:本合金产品尚未被报告具致基因突变性。铅则在数项细胞体外试验中显示有致基因突变性。

复发性及成长性影响：本合金产品不具复发性及成长性影响。铅会导致实验室中动物之脱臼发育，包括天生畸形缺陷及影响雄性生殖能力。

神经性影响：本合金产品尚未被报告具有神经性影响。铅会导致实验室中动物之中枢、末稍神经系统损伤及行为影响。

12.生态资料

本合金产品对生态之毒性：无资料
其单一成分之毒性说明如下： 生态毒性 ecotoxicity：水中的溶解度，在 0.1～1.0mg/l 范围内已被许多研究者证实对大多数鱼类不具有毒性。但浓度在 0.015-3.0mg/l 时，尤其在软水中，会有报告会对许多种类的鱼、甲头类的动物及软体动物、浮游生物具有毒性。 铅对大翻车鱼(Bluegill)/蓝思鱼(Lepomis macrochirus)LC_{50}(48Hrs)资料为 2~5mg/l。铅对水鸟类皆具毒性。 流动性：分解的铅会对转移入土壤内。 持续性/可分解性：铅在环境中会持续且赘存。 生态累赘性（Bioaccumulation）:无资料。

13.废弃处理

本合金产品不属于危害性废弃物：须丢弃时可以委托当地回收商予以回收再生利用。

14.运输资料

USA DOT：未被列入。 运输时本产品不要直接与水接触，并且要注意会滑落、翻落得危险发生

15.法规资料

通常无特定法令规定，但是在会产生粉尘的场所必须遵守劳工安全卫生法劳工工作业环境空气中有害物质容许浓度标准
USA／OHSA：Occupational Safety & Health Administration
USA／ACGIH Guide to protective Clothing. Cincinnati, OH:American Conference of Government Industrial Hygienists,1987
USA／SARA313

16.其他资料

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