SAFETY DATA SHEET

This SDS complies with REACH 1907/2006 and 2001/58/EC, GHS REVISION 5, OSHA 29CFR 1910.1200

Section 1: Chemical Product and Company Identification

CHEMICAL SUPPLIER COMPANY NAME
Shin-Etsu MicroSi, Inc.
10028 South 51st Street
Phoenix, AZ 85044
Safety Data Sheet Competent Person:

EMERGENCY TELEPHONE
Chemtrec 24 hrs, USA: (800) 424-9300
Information: (480) 893-8898
Fax: (480) 893-8637
Customer Service csteam@microsi.com

MANUFACTURER'S NAME: Shin-Etsu Chemical Co., Ltd.
ADDRESS: 6-1, 2-Chome, Ohtemachi, Chiyodaku, Tokyo, 100-0004, Japan
TELEPHONE NUMBER: 81-3-3246-5345 Tokyo, Japan
81-255-45-5811 Niigata, Japan

DATE PREPARED: **November 20, 2008** **REVISION DATE: April 3, 2015**

PRODUCT NAMES: **X-23-7921-5**
CHEMICAL NAME: Organopolysiloxane mixture
FORMULA: Preparation/Mixture
PRODUCT USE: Thermal Interface Material.

Section 2: Hazards Identification

GHS Hazard Class

Not Applicable. This product does not meet the physical, health, or environmental classification criteria of GHS (Globally Harmonized System).

Hazards not otherwise classified (HNOC) or not covered by GHS—none

<10 % of mixture consists of ingredients of unknown acute toxicity.

HAZARD CLASSIFICATION
Not Classified As Hazardous Based On IMO and DOT.

FIRE AND EXPLOSION
Not considered flammable or combustible, but this product will burn if involved in a fire.
Product emits toxic fumes when burned.

POTENTIAL HEALTH EFFECTS

CHRONIC EFFECTS OF OVEREXPOSURE: None
APPEARANCE: Gray grease with a slight odor

NFPA Rating:

Component	Health (Blue)	Flammability (Red)	Reactivity (Yellow)	Special (White)
X-23-7921-5	2	1	0	--

Section 3: Composition, Information on Ingredients

PRODUCT COMPOSITION	APPRX %	CAS NO.	EINECS/ ELINCS	DSL CANADA
Aluminum	<75	7429-90-5	231-072-3	Y
Zinc Oxide*	<25	1314-13-2	215-222-5	Y
Siloxanes and Silicones	<15	-----	Y/N	Y

Trade Secret (TS) Some items on this SDS may be designated as trade secrets. Bonafide requests for disclosure of trade secret information to medical personnel must be made in accordance with the provisions contained in 29 CFR 1910.1200 I 1-13.

*Lead is a natural occurring impurity in Zinc Oxide and is not physically added during the manufacture of Zinc oxide. The percentage of Lead in this product is <0.001.

Section 4: First Aid Measures

Description of First Aid Measures

INHALATION:	Remove to fresh air. If not breathing, provide CPR (cardio pulmonary resuscitation). Get immediate medical attention.
SKIN CONTACT:	Immediately flush skin with plenty of soap and water for at least 15 minutes. Remove contaminated clothing.
EYE CONTACT:	Immediately flush eyes with plenty of water for at least 15 minutes. Get immediate medical attention.
INGESTION:	If swallowed do not induce vomiting, give large quantities of water to drink. Never give anything to an unconscious person. Get immediate medical attention.

Most important symptoms and effects, both acute and delayed

Symptoms/Injuries after Inhalation	No Information
Symptoms/Injuries after Skin Contact	May cause skin irritation.
Symptoms/Injuries after Eye Contact	May cause eye irritation. Symptoms may include discomfort or pain, excess blinking and tear production, with possible redness and swelling.
Symptoms/Injuries after Ingestion	No Information

Indication of any immediate medical attention and special treatment needed

Symptoms may not appear immediately. In case of accident or if you feel unwell, seek medical advice immediately.

Section 5: Fire-fighting Measures

Suitable extinguishing media	Use foam, dry chemical, or carbon dioxide.
Special hazards arising from the substance or mixture	No data available.
Protective actions fire-fighters	Emits toxic fumes under fire conditions. Wear standard protective equipment and self-contained breathing apparatus for firefighting if necessary.
Further information	Use water spray to cool unopened containers.

Section 6: Accidental Release Measures

Personal precautions, protective equipment, and emergency procedures
Wear proper personal protective equipment.

Environmental precautions
Prevent spills material from entering sewers or watercourses.

Methods and materials for containment and cleaning up
Use appropriate materials such as towels or wipes to clean up grease.
Scrap up material and place in waste container.

Reference to other Sections For personal protection reference section 8. For disposal reference section 13.

Section 7: Handling and Storage

Precautions for safe handling

Wear proper protective equipment when handling this material.
Avoid contact with skin, eyes, or clothing.
Wash hands and face after handling this material.

Conditions for safe storage, including any incompatibilities

Store in a cool place at temperatures (Qualitatively <25 ºC)
Keep container closed when not in use.
Keep away from heat and flame.
Utilize chemical segregation.
Follow all applicable local regulations for handling and storage.

Specific uses

This product is intended to aid in the thermal management of electronic devices.

Section 8: Exposure Controls/Personal Protection

Control Parameters

PRODUCT COMPOSITION	ACGIH TLV	OSHA PEL	NIOSH REL
Aluminum	10 mg/m^3 metal dust	15 mg/m^3 Total dust	10 mg/m^3 Total dust
Zinc Oxide	2 mg/m^3	15 mg/m^3	5 mg/m^3
Siloxanes and Silicones	-----	-----	-----

Exposure controls

VENTILATION:	Always provide good general, mechanical room ventilation where this chemical/material is used.
SPECIAL VENTILATION CONTROLS:	Use this material inside totally enclosed equipment, or use it with local exhaust ventilation at points where vapors can be released into the workspace air.
RESPIRATORY PROTECTION:	Follow the OSHA respirator regulations found in 29 CFR 1910.134 or the European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
PROTECTIVE GLOVES:	Wear chemical impervious gloves at all times while working with this product. Recommended glove types include: Laminate Film, Nitrile, or Tri-polymer. Check with your company's glove supplier to ensure chemical resistance.
EYE PROTECTION:	Safety Glasses, Chemical goggles, face shield
PROTECTIVE CLOTHING:	Wear suitable protective clothing to prevent skin contact.
OTHER EQUIPMENT:	Make safety shower, eyewash stations, and hand washing equipment available in the work area.
WORK/HYGIENE PRACTICES:	Avoid breathing vapor. Avoid contact with eyes. Wash hands after handling.

Section 9: Physical and Chemical Properties

	PRODUCT CRITERIA
APPEARANCE - COLOR:	Gray
PHYSICAL STATE:	Grease / Paste
ODOR:	Slight Odor
ODOR THRESHOLD	Not Available for product
PH	Not Available for product
MELTING POINT/FREEZING POINT:	Not Available for product
INITIAL BOILING POINT AND BOILING RANGE:	Not Available for product
FLASH POINT:	>250 ºC (Open Cup); >94 ºC (Closed Cup)
EVAPORATION RATE:	Not Available for product
FLAMMABILITY (Solid, gas)	Not Available for product
UPPER/LOWER FLAMMABILITY OR EXPLOSIVE LIMITS	Not Measured
VAPOR PRESSURE	Negligible (@ 25ºC)
VAPOR DENSITY (AIR = 1)	<1 (Butyl Acetate = 1)
RELATIVE DENSITY (@25 ºC):	2.8 [Water = 1.0]
SOLUBILITY(IES)	Not soluble
OXIDIZING PROPERTIES	Not Available for product
PARTITION COEFFICIENT: n-octanol/water	Not Available for product

AUTO IGNITION TEMPERATURE	Not Available for product
DECOMPOSITION TEMPERATURE	Not Available for product
VISCOSITY	269 Pa·s (@ 25ºC)

Section 10: Stability and Reactivity

Reactivity:	Not reactive.
Chemical Stability:	Stable
Possibility of Hazardous Reactions:	Will not occur
Conditions to Avoid:	None
Incompatibility (Materials to Avoid):	None
Hazardous Decomposition Products:	None

Section 11: Toxicological Information

There is no toxicological information available for the product mixture.

GHS Required Criteria	Toxicity Criteria	Toxicity Information	Comments	Chemical Constituent
Acute Toxicity	TCLo (Human Inhalation)	206 mg/m3 @5 hours/30 days		AL
	TDLo (Oral/Mouse)	1260 mg/kg		AL
	LD50 (Oral/Rat)	>5000 mg/kg	No Mortality	ZnO
	LDLo (Human Oral)	500 mg/kg		ZnO
	LD (Oral/Rat)	>8437 mg/kg		ZnO
Skin Corrosion/Irritation	Rabbit	500mg/24 hours	Mild	ZnO
Serious Eye Damage / Eye Irritation	Rabbit	500mg/24 hours	Mild	ZnO
Respiratory or Skin Sensitization		No information is available.		
Germ Cell Mutagenicity		No information is available.		
Carcinogenicity		No information is available.		
Reproductive Toxicity		No information is available.		
STOT -- Single Exposure		No information is available.		
STOT – Repeated Exposure		No information is available.		
Aspiration Hazard		No information is available.		

STOT = Specific Target Organ Toxicity

OTHER INFORMATION:

Aluminum	Zinc Oxide
OEL-AUSTRIA: MAK 6 mg/m3, dust, JAN1999 OEL-BELGIUM: TWA 10 mg/m3, JAN1993 OEL-BELGIUM: TWA 2 mg/m3 (salts), JAN1993 OEL-BELGIUM: TWA 5 mg/m3 (fumes), JAN1993 OEL-THE NETHERLANDS: MAC-TGG 10 mg/m3, 2003 OEL-DENMARK: TWA 10 mg/m3, dust or fume, JAN1999 OEL-FINLAND: TWA 2 mg/m3 (salts), JAN1993 OEL-FRANCE: VME 10 mg/m3, JAN1999 OEL-FRANCE: VME 5 mg/m3 (fumes), JAN1999 OEL-FRANCE: VME 5 mg/m3 (respirable dust), JAN1993 OEL-GERMANY: MAK 6 mg/m3, JAN1999 OEL-HUNGARY: STEL 5 mg/m3, JAN1993 OEL-HUNGARY: TWA 2 mg/m3, STEL 4 mg/m3 (salts), JAN1993 OEL-NORWAY: TWA 5 mg/m3, JAN1999 OEL-RUSSIA: STEL 2 mg/m3, JAN1993 OEL-SWEDEN: NGV 4 mg/m3 (respirable dust), JAN1999 OEL-SWEDEN: NGV 10 mg/m3 (total dust), JAN1999 OEL-SWITZERLAND: MAK-W 6 mg/m3, JAN1999 OEL-UNITED KINGDOM: TWA 4 mg/m3, respirable dust, SEP2000	OEL-BELGIUM: TWA 10 mg/m3, JAN1993 OEL-DENMARK: TWA 4 mg(Zn)/m3, JAN1999 OEL-BELGIUM: TWA 5 mg/m3, STEL 10 mg/m3 (fume), JAN1993 OEL-FINLAND: TWA 5 mg/m3 (fume), JAN1999 OEL-THE NETHERLANDS: MAC-TGG 5 mg/m3, 2003 OEL-FRANCE: VME (fume) 5 mg/m3, JAN1999 OEL-GERMANY: MAK 5 mg/m3 (fume), JAN1999 OEL-HUNGARY: TWA 5 mg/m3, JAN1993 OEL-NORWAY: TWA 5 mg/m3, JAN1999 OEL-POLAND: MAC(TWA) fume 5 mg/m3, MAC(STEL) fume 10 mg/m3, JAN1999 OEL-SWEDEN: NGV 5 mg/m3, JAN1999 OEL-SWITZERLAND: MAK-W 5 mg/m3, JAN1999 OEL-TURKEY: TWA 5 mg/m3, JAN1993 OEL-UNITED KINGDOM: TWA 5 mg/m3, STEL 10 mg/m3, fume, SEP2000

Only selected Registry of Toxic Effects of Chemical Substances (RTECS) data is presented here. See actual entry in RTECS for complete information.

Section 12: Ecological Information

Toxicity:	LC50 Pisidium casertanum (Ridged-beak peaclam) >1.0 mg/L/96 hr; static, 20-25 deg C, pH 3.5.	Aluminum
	LC50 Salmo trutta (Brown trout, parr about 3 months) 105 ug/L/21 days	Aluminum
	LC50 Lepomis macrochirus (Bluegill sunfish, weight 0.38 g) >320 ppm/96 hr static	Zinc Oxide
	LC50 Oncorhynchus mykiss (Rainbow trout, weight 0.78 g) 1.1 ppm/96 hr	Zinc Oxide
	EC/IC50: >100 mg/L. 72 hour Growth inhibition of Green Algae (Pseudokirchneriella subcapitata)	X23-7783D (Comparable product)
	EC/IC50: >100 mg/L. 48 hour Immobilization of Daphnia magna	X23-7783D (Comparable product)
	LC50: >100 mg/L. 98 hour Survival of Rainbow Trout (Oncorhynchus Mykiss)	X23-7783D (Comparable product)
Persistence and degradability:	No information is available.	
Bioaccumulative potential	No information is available.	
Mobility in soil:	No information is available.	
PBT and vPvB assessment:	PBT/vPvB assessment not available as chemical assessment not required/not conducted	
Other adverse effects:	No information is available.	

Not all of the ingredients have been tested for Ecotoxicity.

Section 13: Disposal Considerations

Regulatory note: Laboratory testing has confirmed that this product does not meet the criteria of an "Environmentally hazardous substance", UN 3077. Upon request, the testing results will be provided. Also, reference Section 12.

Waste from residues/unused products: Follow the waste disposal requirements of your country, state, or local authorities.

Contaminated packaging: Contaminated packaging material should be disposed of as stated above for residues and unused product.

Rinsate: Do not dispose of rinse water containing product in a sanitary sewer system or stormwater drainage system.

Section 14: Transport Information

DOT TRANSPORT:	Not Regulated
ADR: International Carriage of Dangerous Goods by Road	Not Regulated
RAIL TRANSPORT:	Not Regulated
SEA TRANSPORT: IMDG	Not Regulated
AIR TRANSPORT: IATA/ICAO	Not Regulated

Section 15: Regulatory Information

TOXIC SUBSTANCES CONTROL ACT (TSCA) STATUS:

This product is in compliance with rules, regulations, and orders of TSCA and should be used in compliance with TSCA's Low Volume Exemption (LVE) regulations.

SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (SARA) TITLE III SECTION 313 SUPPLIER NOTIFICATION:

This regulation requires submission of annual reports of toxic chemical(s) that appear in section 313 of the Emergency Planning and Community Right To Know Act of 1986 and 40 CFR 372. This information must be included in all SDS's that are copied and distributed for the material.
The Section 313 toxic chemicals contained in this product are: Aluminum, Zinc

CALIFORNIA PROPOSITION 65:

This regulation requires a warning for California Proposition 65 chemical(s) under the statute.
The California proposition 65 chemical(s) contained in this product are:

WARNING: This product contains a chemical (lead) known by the State of California to cause cancer, birth defects or other reproductive harm.

Lead is a naturally occurring impurity in Zinc Oxide.
Lead: No Significant Risk Level (NSRL) for carcinogens = 15 µg/day (Oral)
Lead: Maximum Allowable Dose Level (MADL) for reproductive toxicants = 0.55 µg/day

STATE RIGHT-TO-KNOW TOXIC SUBSTANCE OR HAZARDOUS SUBSTANCE LIST:

Florida Toxic Substance(s):	Not listed
Massachusetts's hazardous substance(s):	Aluminum, Zinc Oxide
Pennsylvania hazardous substance code(s):	Aluminum, Zinc Oxide
New Jersey	Aluminum, Zinc Oxide
Illinois	Aluminum
Michigan	Not listed

CANADA:
This SDS contains all of the information required by the Controlled Products Regulations (CPR).

WHMIS-INFORMATION:
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR), SOR/88-66, Current to February 20, 2012. The classes of controlled products listed in the CPR, Section 32, Part IV, have been reviewed and based on Professional Judgment this product has been determined not to be WHMIS controlled.

EUROPEAN UNION:
This product has been reviewed for compliance with the following European Community Directives: REACH 1907/2006; Regulation (EC) No 1272/2008 on classification, labeling, and packaging (CLP) of substances and mixtures. None of the chemicals used in this product are on the EU's REACH SVHC (Substances of Very High Concern) chemicals list (as of December 17, 2014).

RoHS CERTIFICATION: The Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS), EU Directive (2002/95/EC-rescinded) and 2011/65/EU. We hereby certify that the hazardous substances regulated by the RoHS Directive 2011/65/EU are not used intentionally as ingredient(s) for X-23-7921-5, which is manufactured by Shin-Etsu Chemical Co. Ltd. This certification is valid only for this product, X-23-7921-5. Packaging materials were not considered for this certification.

WEEE CERTIFICATION: Waste Electrical and Electronic Equipment (WEEE), European Union Directive 2002/96/EC. Shin-Etsu MicroSi does not consider X-23-7921-5 a product that qualifies as one of the 10 categories of electrical and electronic equipment listed in Annex 1A of Directive 2002/96/EC. Also, the products manufactured by Shin-Etsu MicroSi do not intentionally contain any of the regulated substances, preparations, or components listed in Annex II of Directive 2002/96/EC. This certification is valid only for this product: X-23-7921-5. Packaging materials were not considered for this certification.

Section 16: Other Information

Initial issue date:	November 20, 2008
Final revision date:	April 3, 2015
Revision Number:	5
Revision explanation	Revised SDS to comply with GHS SDS requirements
Information Sources:	RTECS, ECHA, REACH, OSHA 29CFR 1910.1200

FOR INDUSTRIAL USE ONLY

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