PASSIVE COMPONENT MATERIALS

HIMEC, UNIMEC, OHMCOAT

NAMICS

PRODUCT RANGE

➢ Sintering Materials =>> HIMEC

- Used for Electrodes on Passive Components
- For Photovoltaic Pastes (Front Side & Back Side Silver Paste)
- For Termination Electrodes & Inner Electrodes for MLCC and Chip Inductor
- For Termination Electrode & Bottom Electrode for Chip Resistors
- As Fine Line Thick Film Paste on various Ceramic Substrates

➢ Epoxy Silver Pastes =>> UNIMEC

- As Polymer (Soft…; Flexible…) Termination for Chip Resistors, MLCCs, and Tantalum Capacitors
- As Electrical Conductive Adhesive to replace Solders

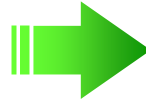
SINTERING MATERIALS

HIMEC

COMPOSITION OF HIMEC

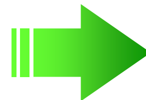
General Composition

- Metal Powder
- Glass Frit
- Resin
- Solvent



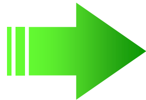
Metal : *Silver, Copper, Nickel, etc.*

Shape: *Spherical ,Flake, etc.*



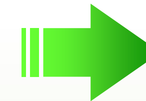
Glass Frit:

SiO2, B2O3, ZnO, Bi2O3, R2O, RO etc.



Organic Resin

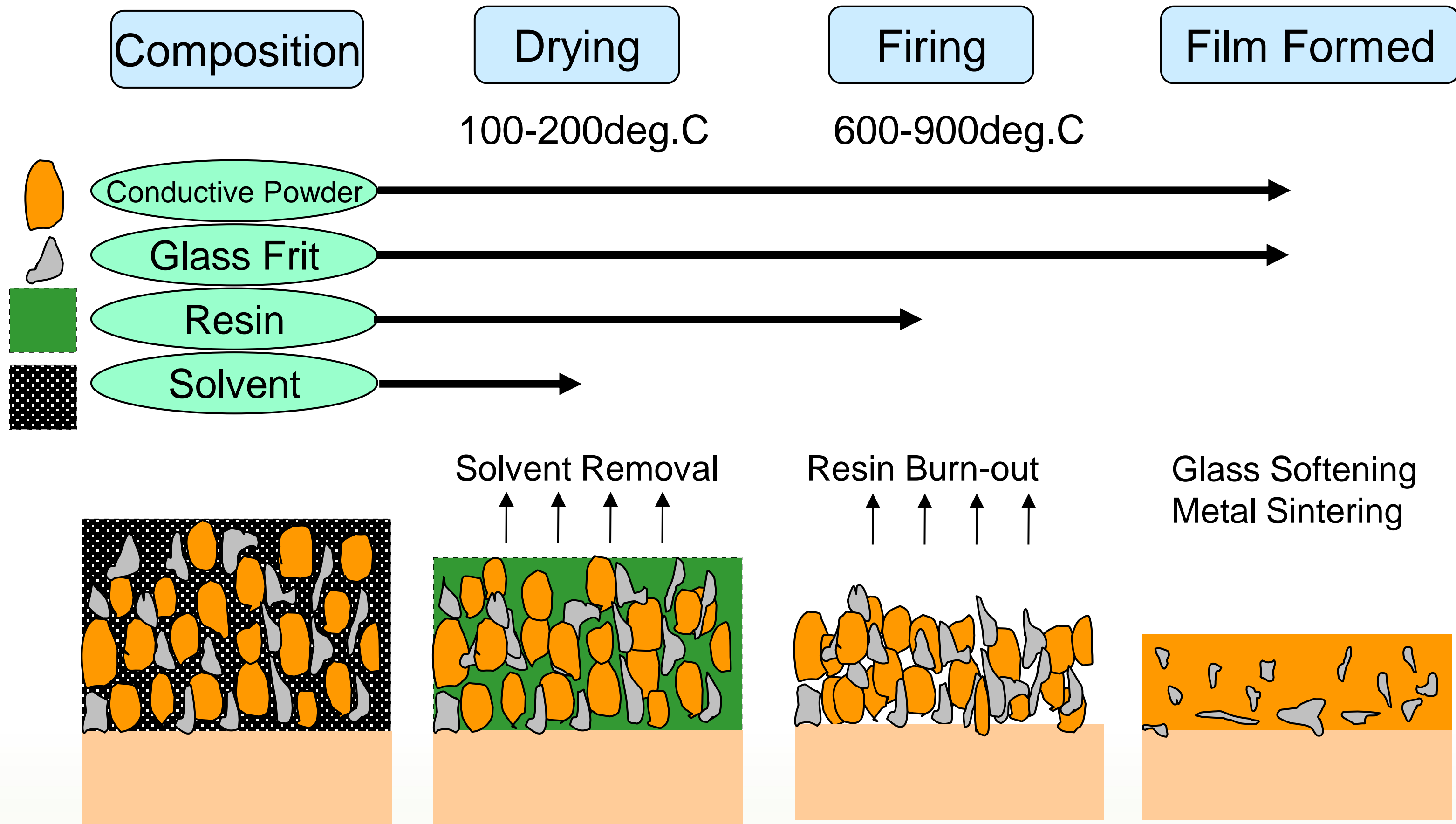
Ethylcellulose Resin, Acrylic Resin etc.



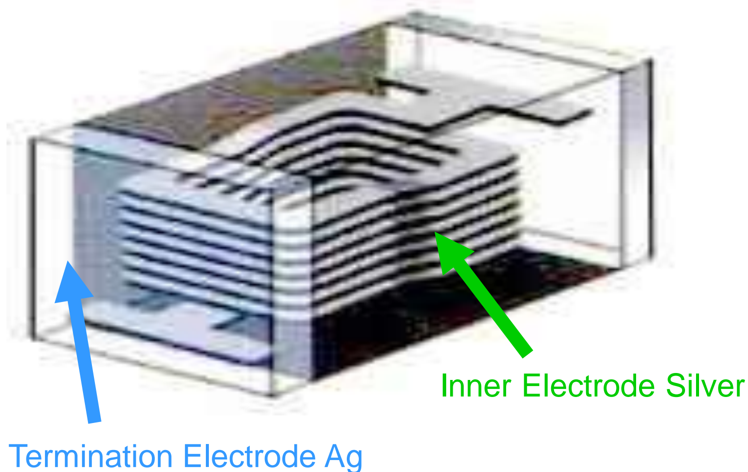
Organic Solvent

Butyl Carbitol, Terpineol etc.

Formation Process

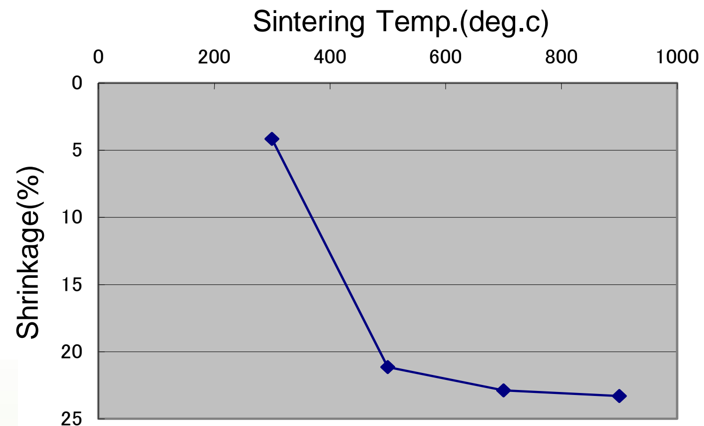


INDUCTOR, VARISTOR, THERMISTOR



Characteristics

- Lead free
- High Reliability
- Good Plating Fluid Rresistance
- Good Adhesion Strength
- Good Ohmic Contact
- Good Solderability
- Low Resistance
- Various Shrinkage Rate



Material Characteristics can be Adjusted

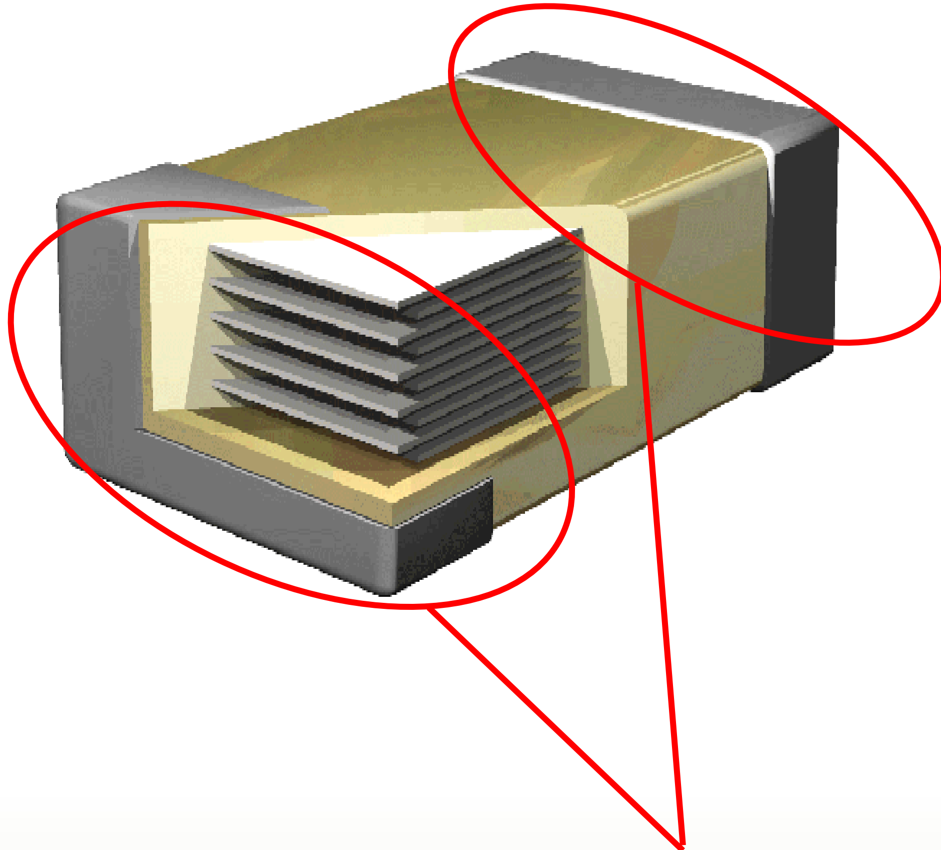
- Viscosity
- Thixotropy
- Ag Content
- Sintered Density
- Shrinkage etc…

Inductor Products

Product		DP4329	DP4511A	DP4366E	DP4857L	DP4340
Viscosity * (Pas)		55	65	40	45	50
Drying	Max Temp.	150°C	150°C	150°C	150°C	150°C
	Hold Time	15 Min	15 Min	15 Min	15 Min	15 Min
Firing	Max Temp.	620°C	640°C	620°C	610°C	620°C
	Hold Time	10 Min	10 Min	10 Min	10 Min	10 Min
	In-Out	60 Min	60 Min	60 Min	60 Min	60 Min
Silver Contents (%)		63	65	64	52	46
Application		Chip Inductor	Chip Inductor	Chip Inductor	Chip Inductor	Chip Inductor
Use On		Single Chip	Single Chip	Array Chip	Low Silver Content	Low Silver Content

* Viscosity: Brookfield HB type, SC4-14spindle, 10rpm(4.0^{-1}s), 25C

CAPACITOR



Characteristics

- Lead Free
- High Reliability
- Good Plating Fluid Resistant
- Good Adhesion Strength

Terminal Electrode: Silver or Copper Paste

NAMICS

Cu- Termination

Product		6019	6058
Viscosity * (Pas)		50	45
Drying	Max Temp.	150°C	150°C
	Hold Time	15 Min	15 Min
Firing	Max Temp.	900°C	850°C
	Hold Time	10 Min	10 Min
	In-Out	60 Min	60 Mmin
Inorganic Contents (%)		78	78
Application		MLCC	MLCC
Used For		X5R, X7R	COG

* Viscosity: Brookfield HB type, SC4-14spindle, 10rpm(4.0^{-1}s), 25C

NAMICS

THICKFILM PASTES

- These Series of Pastes makes the use of Palladium or Platin in Silver Pastes obsolete without missing out on any of the Key Characteristics
  - Excellent Solder Wetting
  - Solder Leach Resistance
  - Ag-Migration Resistance
  - Excellent Adhesion Strength

NAMICS

PRODUCTS FOR AL_2O_3 SUBSTRATE

HR Paste	HR4501	HR4441B	HR4301A	HR4201A
Silver Content	86.5 %	87.0 %	86.5 %	87.0 %
Viscosity 10 rpm	200 Pa•s	200 Pa•s	230 Pa•s	200 Pa•s
Resistivity (mΩ/□ at 10 μm Fired Film Thickness)	2.5 mΩ/□	2.5 mΩ/□	2.5 mΩ/□	2.5 mΩ/□
Comparison Chart				
Ag/Pd/Pt (78/13/9) Ag/Pd (70/30)				
Ag/Pd (79/21)				
Ag/Pt (99/1)				
Compatible to Electroless Plating				

*1 Brookfield HB type SC4-14 spindle at 25℃

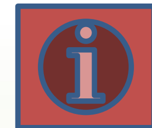
CHARACTERISTICS

Paste	HR4501	HR4441	HR4301	HR4201
Solderability *2	OK at 230℃, RMA Flux, 100% for 5 second dip			
Solder Leaching *3	≧ 6 dips	≧ 3 dips	≧ 2 dips	≧ 1 dips
Resistivity (@10 μm Fired Film Thickness)	2.5 mΩ/□	2.5 mΩ/□	2.5 mΩ/□	2.5 mΩ/□
Fired Film Thickness	15 – 20 μm	15 – 20 μm	15 – 20 μm	15 – 20 μm

*1 *Brookfield HB type SC4-14 spindle at 25℃*

*2 *Lead-free solder 96.5Sn-3Ag-0.5Cu (=SENJU METAL INDUSTRY CO.,LTD. M705) at 230℃, RMA flux, 100% for 5 second dip*

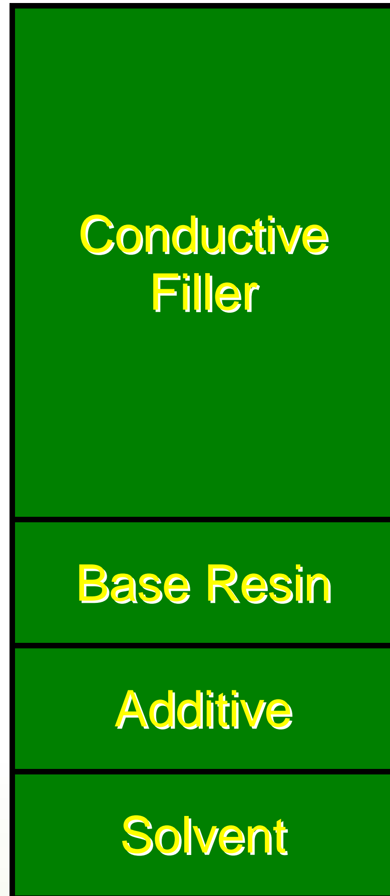
*3 *Lead-free solder 96.5Sn-3Ag-0.5Cu (=SENJU METAL INDUSTRY CO.,LTD. M705) at 250℃, RMA flux, 10 seconds dip for each dip*

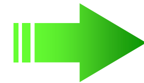


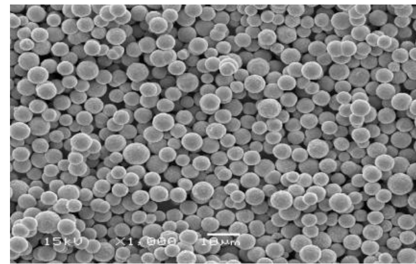
Thermal Curing Conductive Pastes

UNIMEC

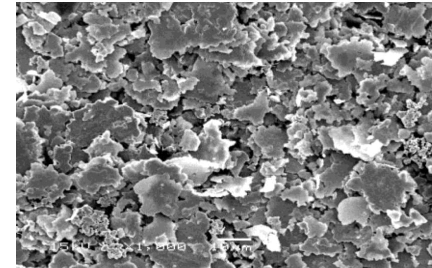
BASIC COMPOSITION



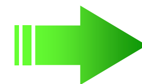




Spherical Silver

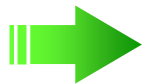


Flake Silver



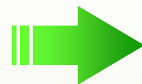
Organic Resin

Epoxy Resin, Phenolic Resin, Silicone Resin etc.



Surfactant

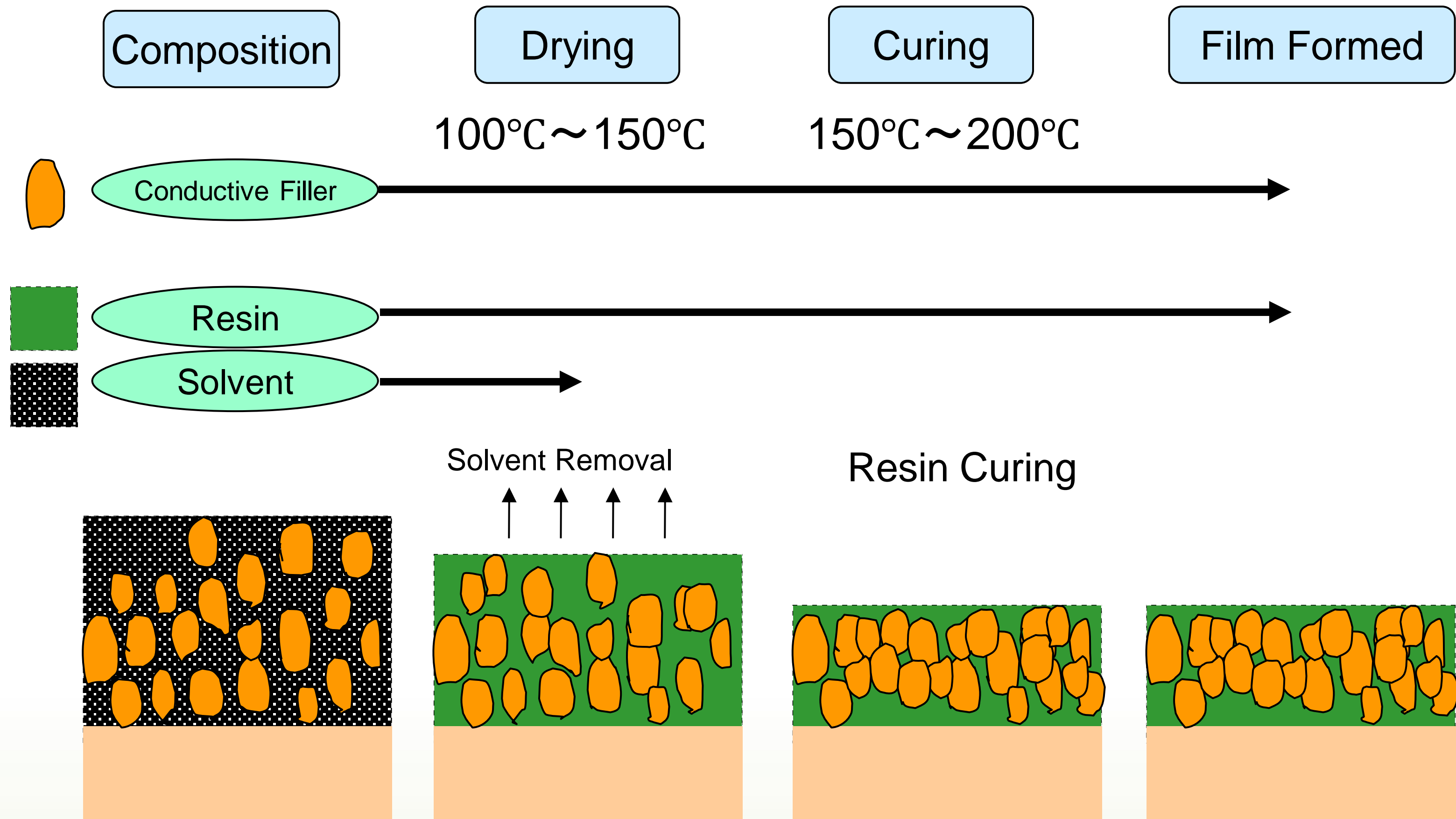
Coupling agent etc.



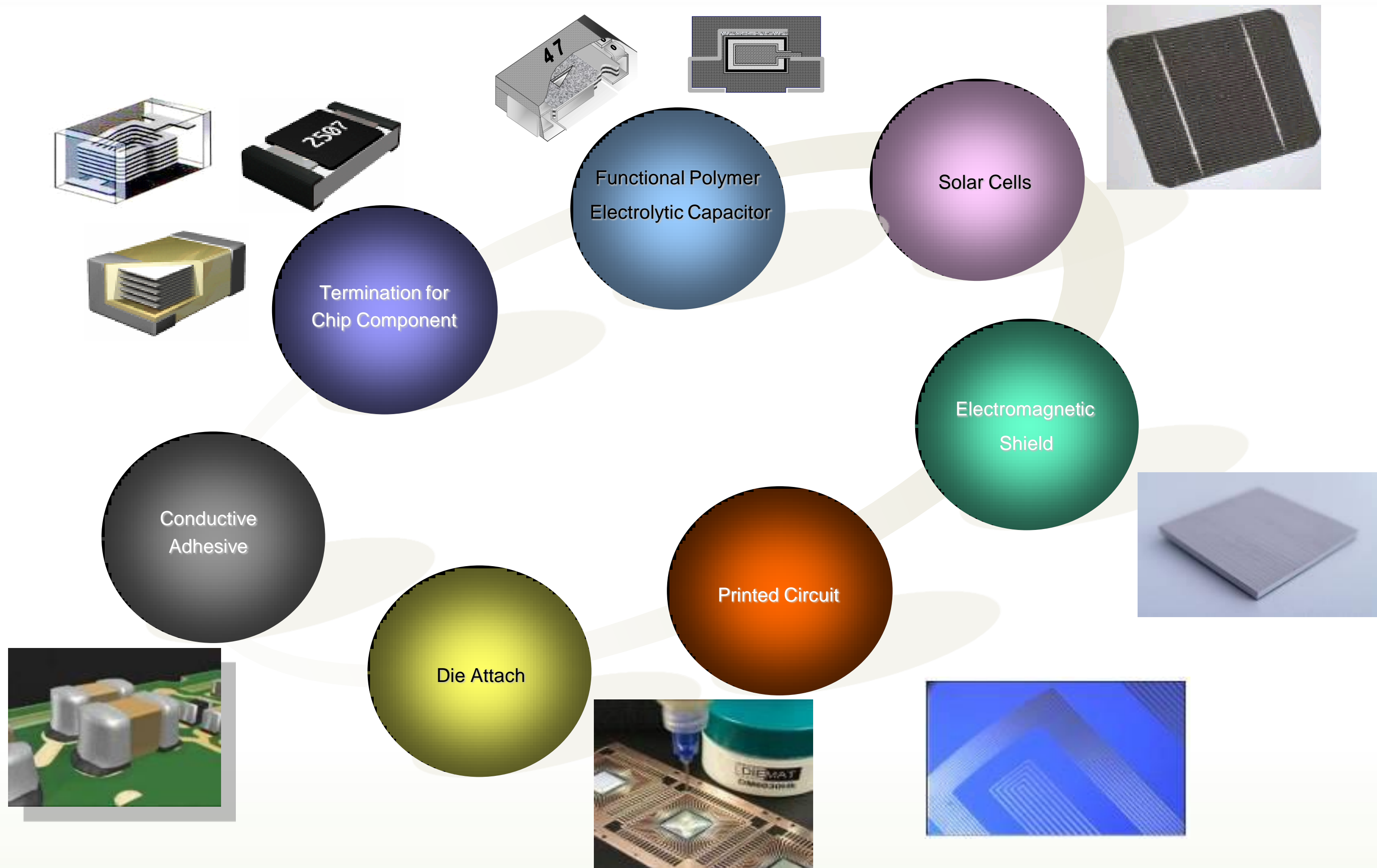
Organic Solvent

Ethyl Carbitol, Butyl Carbitol etc.

Film Formation

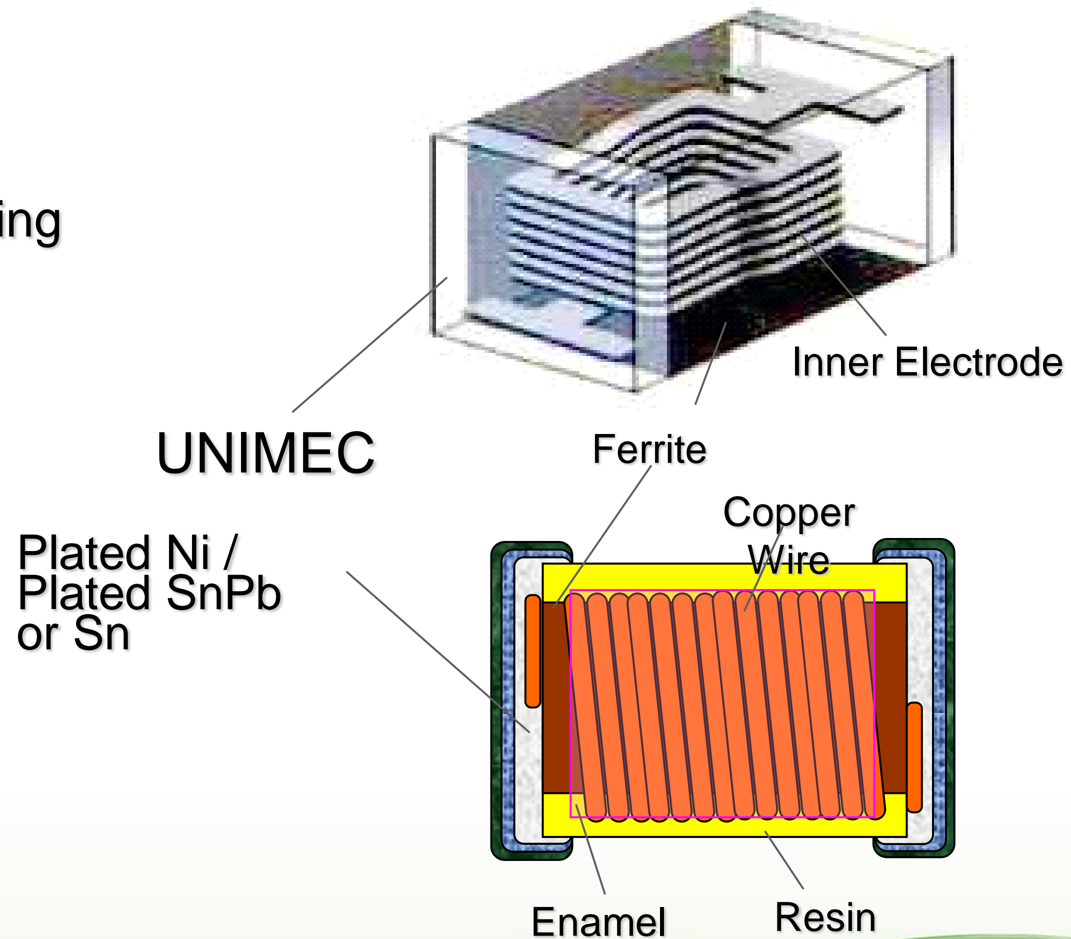


APPLICATIONS



Chip Inductor

- Features
- Low Resistivity
- Low Temp. Curing
- Plateable



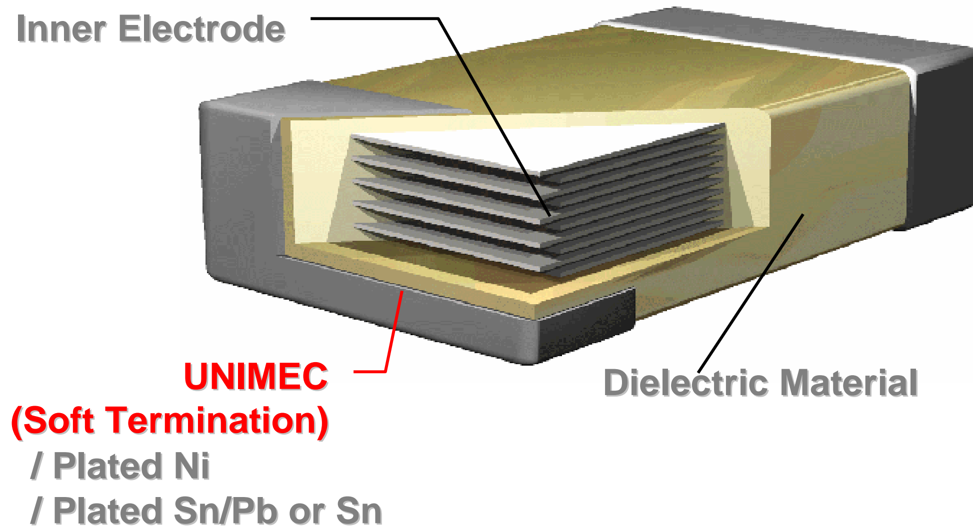
INDUCTOR PRODUCTS

Product	H9132	XH9108A-1
Viscosity @ 25°C [Pas]	35	20
T.I.	7,0	10,0
Volume Resistivity	30,0	7,0
Adhesion Strength	1,5	2,5
Non-Volatiles Contents (%)	81,0	90,0
Silver Contents (%)	76,0	85,0
Metal Powder	Sphere / Flake	Sphere
Resin Type	Epoxy / Phenol	Epoxy / Phenol
Solvent	Butyl Carbitol	Butyl Carbitol
Curing Condition	30 Min @ 200°C	30 Min @ 200°C
Characteristic	Low Resistance Good Coating Shape	Ultra Low Resistance

MLCC MATERIALS

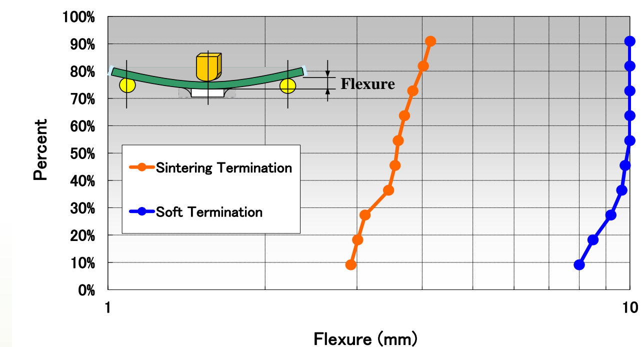
➢ Features

➢ Low Resistivity
➢ High Adhesion
➢ Low Elastic Modulus
➢ No Plating Solution Penetration
➢ Plating Capability



➢ Application Process

➢ Dipping
➢ Transferring



2 LAYER BME - MLCC MATERIALS

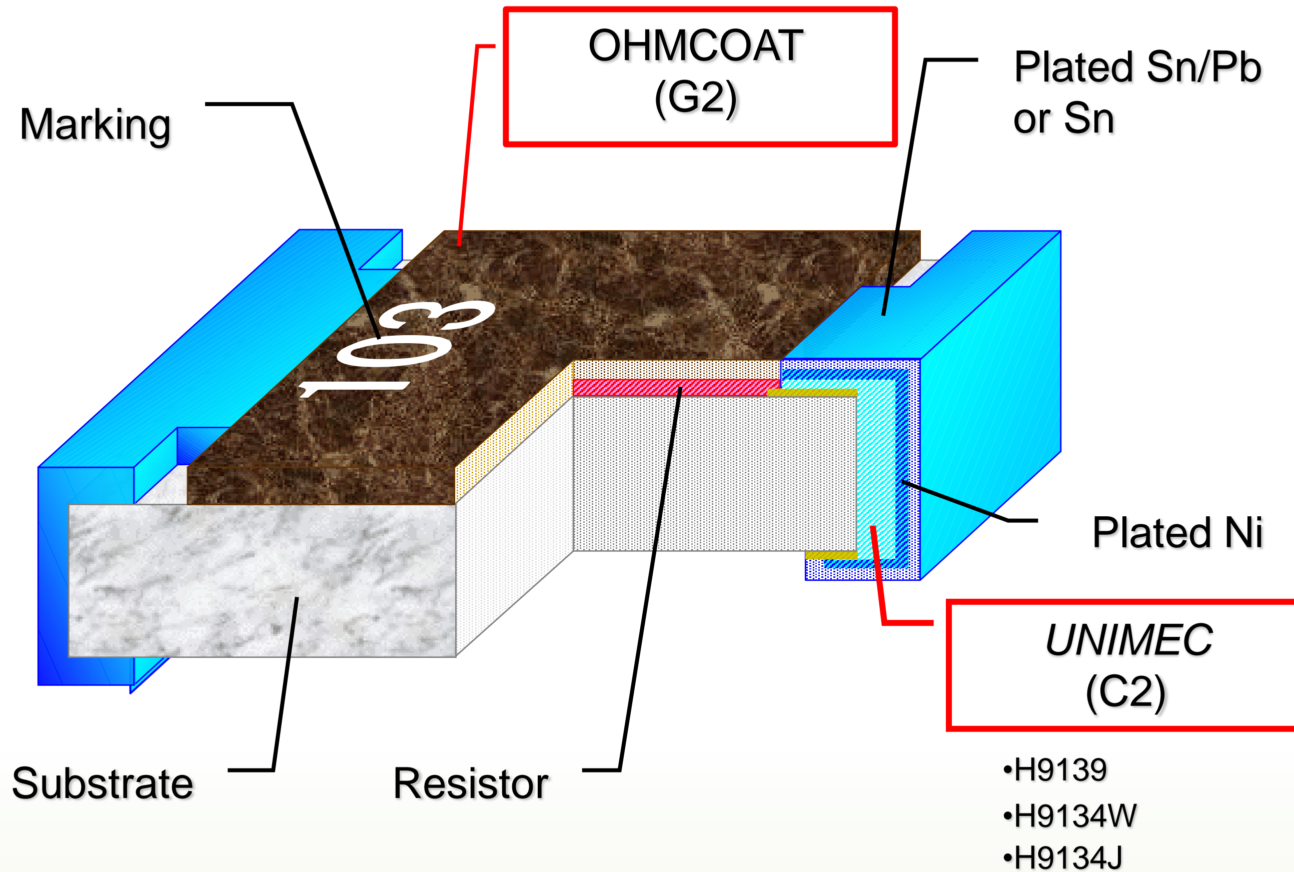
Product	H9135	H9198	H9190
Viscosity @ 25°C [Pas]	35	45	40
T.I.	5,6	4,4	2,9
Volume Resistivity(*E-4 Ohm.cm)	4,0	2,0	5,5
Adhesion Strength (kN/cm^2)	2,6	1,8	2,2
Non-Volatile Contents (%)	84,5	89,0	85,0
Silver Contents (%)	67,0	78,0	41,0
Bending Modulus(GPa)	7,0	5,0	7,1
Metal Powder	Sphere/Flake	Sphere/Flake	Sphere/Flake
Resin Type	Epoxy/Phenol	Epoxy/Phenol	Epoxy/Phenol
Solvent	Dibasic Acid Ester	Butyl Carbitol	Butyl Carbitol
Curing Condition	30min @ 200C	30min @ 170C	30min @ 170C
Build	BME Base, Polymer Top	BME Base, Polymer Top	BME Base, Polymer Top
Characteristics	High Adhesion Strength	High Bending Strength Good Coating Shape	Good Coating Shape Low Cost Solution

NAMICS

1 LAYER PME-MLCC MATERIALS

Product	H9135-72	H9193
Viscosity @ 25°C [Pas]	12	15
T.I.	12	16
Volume Resistivity (*E-4 Ohm.cm)	8,0	2,5
Adhesion Strength (kN/cm^2)	2,0	0,8
Non-Volatile Contents (%)	80,0	80,0
Bending Modulus (GPa)	7,0	2,6
Ag Powder	Sphere / Flake	Sphere / Flake
Resin Type	Epoxy / Phenol	Epoxy / Phenol
Solvent	Butyl Carbitol	Butyl Carbitol
Curing	30 Min @ 200°C	30 Min @ 200°C
Application	Direct on Inner	Direct on Inner
Characteristics	Standard	Low Bending Modulus

CHIP RESISTOR



- H9139
- H9134W
- H9134J

NAMICS

Ag Pastes for R-Chips

Product	H9134W	H9155	H9139	H9156	H9143	H9117S
Viscosity @ 25°C [Pas]	15	20	17	25	17	60
T.I.	6,6	5,5	20,0	20,0	22,0	6,9
Volume Resistivity (*E-4 Ohm.cm)	4,0	4,0	2,5	2,5	4,0	0,9
Adhesion Strength (N/mm^2)	26,0	26,0	17,0	17,0	12,0	16
Non-Volatile Content (%)	82,0	83,5	81,5	82,5	74,0	87,0
Ag Powder	Sphere / Flake	Sphere / Flake	Sphere / Flake	Sphere / Flake	Sphere / Flake	Sphere / Flake
Resin Type	Epoxy / Phenol	Epoxy / Phenol	Epoxy / Phenol	Epoxy / Phenol	Epoxy / Phenol	Epoxy / Phenol
Solvent	Dibasic Acid Ester	Dibasic Acid Ester	Ethyl Carbitol	Ethyl Carbitol	Butyl Carbitol	Butyl Carbitol
Curing Condition	30 Min @ 200°C	30 Min @ 200°C	30 Min @ 200°C	30 Min @ 200°C	30 Min @ 200°C	30 Min @ 200°C
Application	R Chip (Single)	R Chip (Array)	R Chip (Single)	R Chip (Array)	R Chip (Single)	R Chip (C4)
Characteristic	High Adhesion Strength	High Adhesion Strength	Easy Plating	Easy Plating	Low Ag Contents	Seamless Printing

Chip Resistor Coatings

Product			Ohmcoat1021	Ohmcoat1028	Ohmcoat1057K
Color			Navy Blue	White	Black
Viscosity @25°C		Pas	28	35	35
Tg		°C	100	100	120
CTE	< Tg	ppm/°K	35	32	50
	> Tg	ppm/°K	115	120	110
Water Absorption		%	3,8	3,4	3,6
Volume Resitivity		Ohm.cm	2,10E+15	2,60E+15	1,00E+15
Pencil Hardness			6H	6H	6H
	After Solvent Immersion		5H	5H	5H
Drying	Time	Min.	10	10	10
	Temperature	°C	150	150	150
Curing	Time	Min.	30	30	20
	Temperature	°C	200	200	220

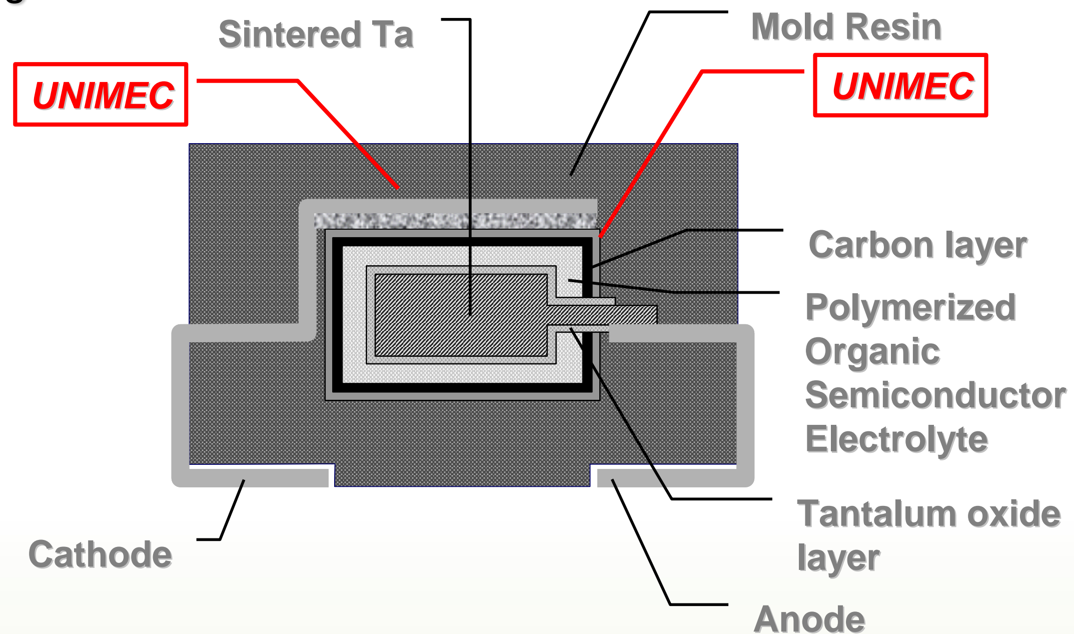
TA ELECTROLYTIC CAPACITOR

- Features

- Low Resistivity
- Low Temperature Curing
- High Purity

- Application by

  - Dipping
  - Transferring



NAMICS

MATERIALS FOR TA CAPACITORS

Product No.		H9480	H9480S	H9470
Application		Anode Adhesive	Ta Body Coating	Ta Body Coating
Characteristics		Low Resistivity	Low Resistivity, Low Viscosity	Low Resistivity Low Viscosity Good Corner Coverage
Viscosity @ 25°C	Pas	54	22	22
T.I.		42,0	44,0	33,0
Silver Contents	%	82,0	79,0	83,0
Non-Volatile Contents	%	91,0	87,0	87,0
Volume Resistivity	Ohm.cm	5,0E-05	5,0E-05	5,0E-05
Adhesion Strength	N/mm²	15,0	15,0	10,0
Curing		30 Min @ 150°C	30 Min @ 150°C	30 Min @ 150°C

NAMICS

NAMICS

MUTUAL PROSPERITY TO BOTH MANKIND AND NATURE
THROUGH CREATIVITY, INNOVATION AND SENSITIVITY