

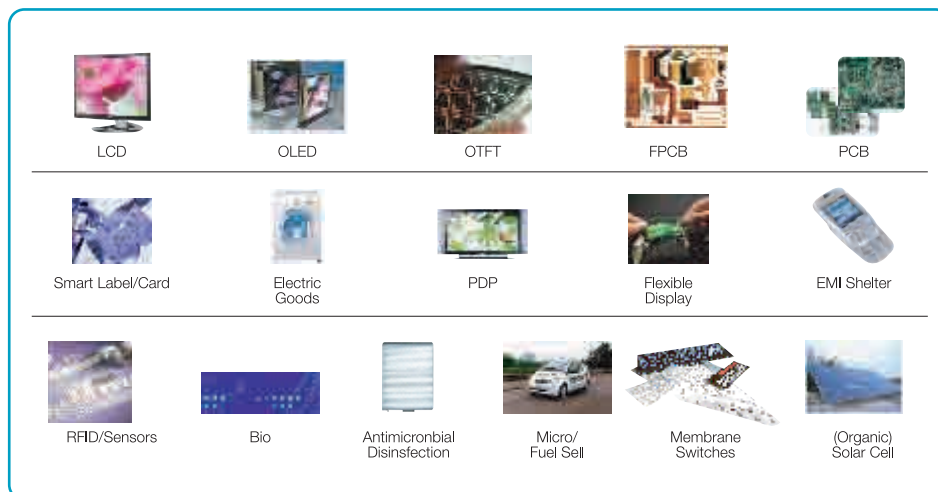
Based on our deep experience and high reputation as an ink manufacturer in IP (image printing) market, InkTec proudly introduces our TEC (Transparent Electronic Conductive) Inks which are formulated totally differently with conventional conductive inks.

TEC (Transparent Electronic Conductive) Ink Specially designed by InkTec

What is the TEC inks? TEC is the acronym of "Transparent Electronic Conductive", and one of the salient features of the TEC ink is its transparency in liquid phase. It means TEC is a non-particle type ink before sintering, specially designed by InkTec, which is a world-class research and manufacturing company of inkjet applications.



Applications InkTec Electronic Ink is applicable to various industries such as RFID in distribution industry, smart label, PCB/FPCB, displays(OLED, LCD, PDP), EMI shielding, Solar cell and antifungal filters etc. And the ink is expected to be the core material of mass printing process which is a new paradigm in IT & electric industry and to reduce processes and cost in RFID component market.



TEC Ink

TEC inks complement the weak points of other nano particle inks such as stability, thickness, low temperature sintering and adjustable viscosity

Short Sintering Time in Low Temperature/ Controllable Viscosity

Different manufacturing method with the nano-ink developed by the conventional nano-technology
: Chemical materials with special Ag(Soluble Silver Cluster & Complex)

Types of TEC Inks

Classification	IJ Series (Inkjet Inks)	PA Series (Paste Inks)	CO Series (Coating Inks)	PR Series (Printing Inks)
Printing Process	Inkjet	Screen(Rotary/Flat)	Spray/Dipping	Gravure/Flexo/Offset
Layer Thickness	(Depending on dpi) 100nm~1.5μm	± 1μm	100~150nm	50~300 nm
Viscosity	3~15cps	3,000 ~ 100,000 cps	1~30cps	10~300cps
Sintering Temp	130~350°C	140~560°C	120~150°C	120°C
Volume Resistivity (Ωcm)	$2.5 \times 10^{-6} \sim 4.2 \times 10^{-6}$	$3.0 \times 10^{-6} \sim 6.0 \times 10^{-6}$	-	-

Advantages of TEC Inks

- **Advanced manufacturing method** : Soluble Silver Cluster & Complex type
- **Reduction of the raw materials(Ag)** : Forming the thin layer compared to the others
- **Low temperature sintering (lower than 130°C)** : Applicable to heat-sensitive substrates
- **Thin film & High Conductivity after short sintering time**
- **High stability and long-term storage**



TEC-IJ SERIES (INKJET INK)

IJ series is purely transparent silver ink which is designed by InkTec's outstanding technology and research solution. Different from other existing conductive inks based on nano-technology, InkTec's Inkjet ink is not formulated by particle structure so it is stable even in normal temperature and applicable to various fields in the electronic industry.

Product Features



Stable Jettability

The ink flows smoothly due to the formulation of no-particle structure and makes uniform ink jetting without head clogging.

Short Sintering Time in Low temperature

It takes short time for sintering so it could improve productivity by about 30min/ 100~150°C, providing High Electrical Conductivity.

Fine Pattern & Uniform Thin Layer

Good conductivity though forming thin film compared to the existing technologies (Reduction of raw materials)

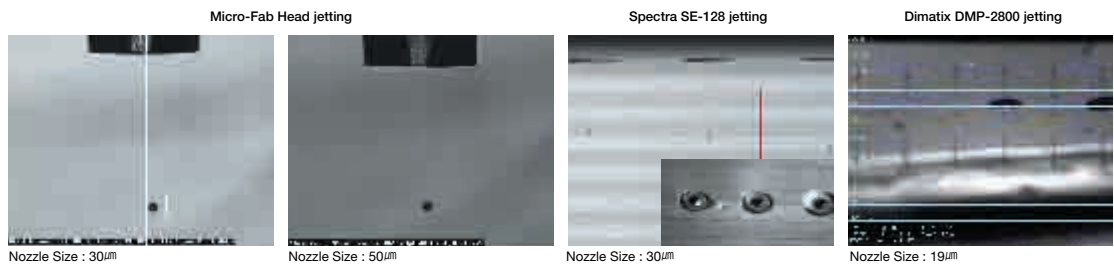
Compatibility with various types of print heads

InkTec provides a total solution for inkjet printing including suitable wave form for each print head.

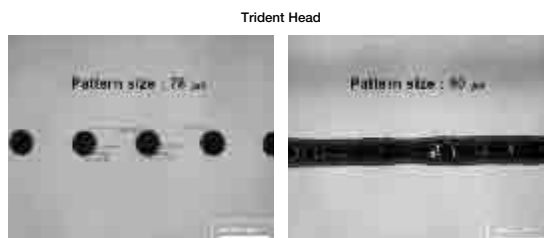
Ink Properties

Classification	TEC-IJ-010	TEC-IJ-020	TEC-IJ-030	TEC-IJ-040
Ink Type	Soluble silver cluster & complex		Nano Silver Particles	Soluble silver cluster & complex
Appearance	Transparent		Dark Brown(Bluish)	Transparent
Vehicle	Solvent-based			
Viscosity	9 ~ 15cps	9 ~ 15cps	3 ~ 15cps	9 ~ 15cps
Surface Tension	30 ~ 32dynes/cm	30 ~ 32dynes/cm	27 ~ 32dynes/cm	30 ~ 32dynes/cm
Density	1.07g/cm ³	1.07g/cm ³	1.40g/cm ³	1.07g/cm ³
Metal Contents	15wt. %	20wt. %	40wt. %	20wt. %
Particle Size	None Particle Based Ink		5~15nm	None Particle Based
Availability	Available Now		Under Development	Available Now

Jetting Drop Image



Jetted Pattern Image



Performance Data

Classification	TEC-IJ-010	TEC-IJ-020	TEC-IJ-030	TEC-IJ-040
Curing Temp.	130~150°C (5~10min)	200~250°C (1~30min)	300~350°C (5~30min)	130~150°C (5~10min)
Adhesiveness (ASTM D3359 rating)	PET : Class 5B~4B	PET : Class 5B~4B	Glass : Class 4B~3B	PET : Class 5B~4B
Substrates	PET, PI, Glass, Polysulfone etc.	PI, Polysulfone, Glass etc.	Glass etc.	PET, PI, Glass, Polysulfone etc.

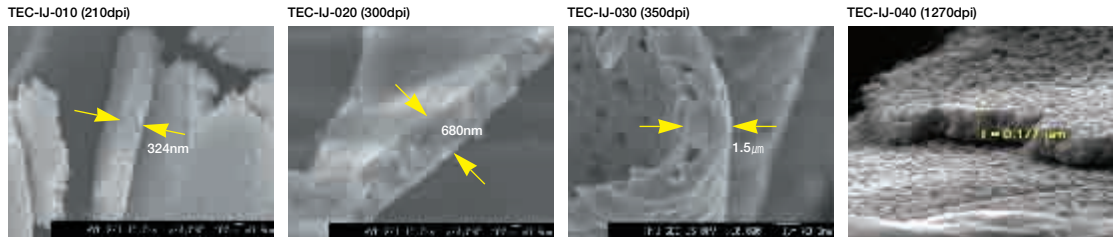
※ Depending on the type of substrate, primer treatment is required to improve adhesiveness. InkTec is also providing primer solutions.

Thickness and Resistivity

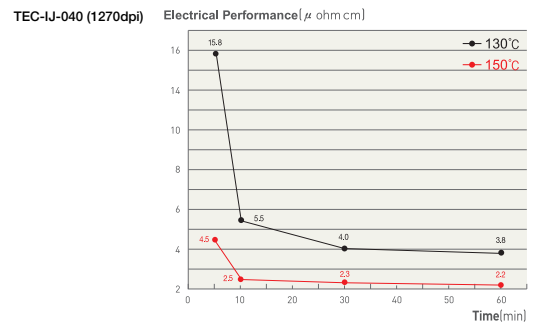
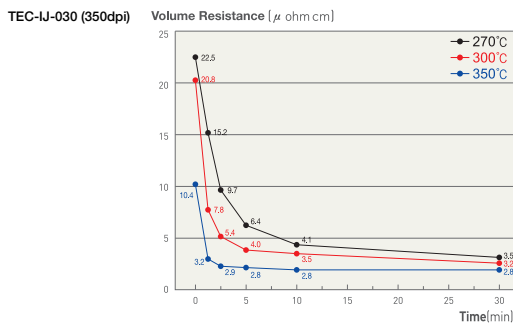
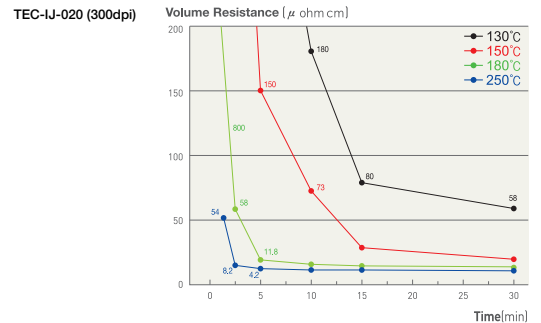
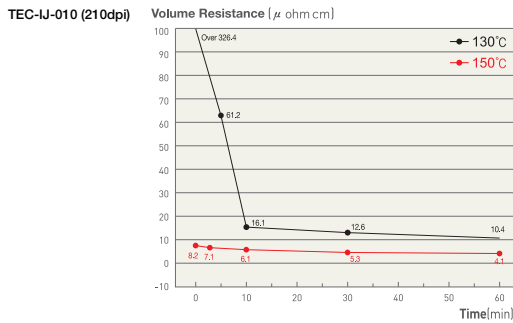
Classification	TEC-IJ-010	TEC-IJ-020	TEC-IJ-030	TEC-IJ-040
Printing Layer Thickness(Dpi)	323nm(210dpi)	680nm(300dpi)	1.5μm(350dpi)	177nm(1270dpi)
Surface Resistivity(mΩ/sq.)	130	58	19.2	142
Volume Resistivity(Ωcm)	4.2×10^{-6}	4.0×10^{-6}	2.88×10^{-6}	2.5×10^{-6}

Resistivity depends on film thickness (Bulk Silver resistivity : $1.6 \times 10^{-6} \Omega\text{cm}$)

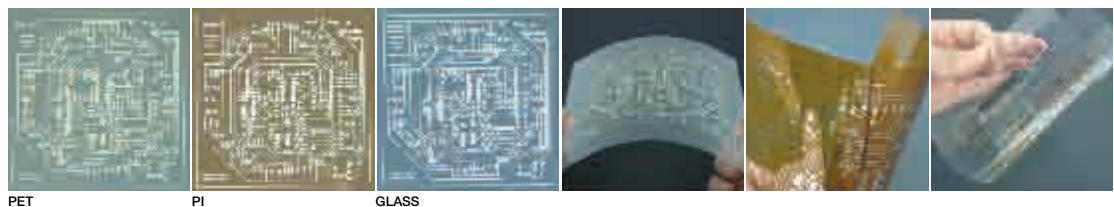
DPI & Thickness



Volume Resistivity



Inkjet Printing Sample



About the InkTec - InkTec, which has shown high-speed growth of refill inks for printers in IP(image Printing) industry since its establishment in 1992, developed Electronic Silver Inks based on the 15 years' technical power of inkjet technology. Electronic Silver Inks are Ag-based conductive inks suitable for RFID Tags, PCBs, reflective films, display devices, EMI shielding and etc. According to our business plan for electronic materials, we have completed 2nd plant in March 2006 and this plant is equipped with up-to-the-date electromagnetic products manufacturing facilities. Electronic materials business with Electronic Silver Ink will be a new growth engine of InkTec.

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InkTec
www.inktec.com

TEC-PA SERIES(PASTE INK)

InkTec Conductive Nano Silver Paste Ink is a conductive nano paste of new Hybrid Type, developed with our original technology. It has good conductivity for various substrates as well as flexibility, high adhesiveness and short-term sintering so it can be applied to many fields in electronics industry.

Product Features



Fine Pattern with Superior Conductivity

TEC-PA Series are innovative nano silver paste inks which contain 20~50nm size nano particles. Due to InkTec's unique manufacturing method, electrical conductivity & Volume Resistivity is much better than conventional conductive inks.

Short Sintering Times in Low-temperature

It takes short time for sintering so it can improve productivity by about 5min / 140°C, generates High Electrical Conductivity. (The sintering temperature & time vary according to the ink model.)

Controllable Viscosity according to Application

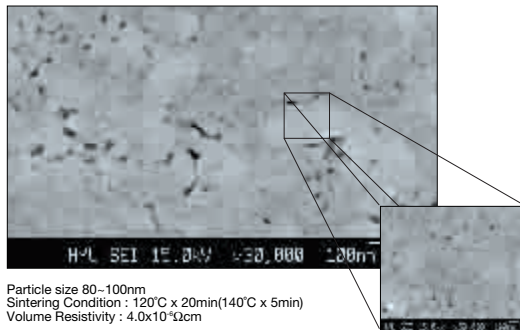
Depending on customer's printing methods and applied substrates, we can provide the inks adjusted to the viscosity the customer requires.

Ink Properties

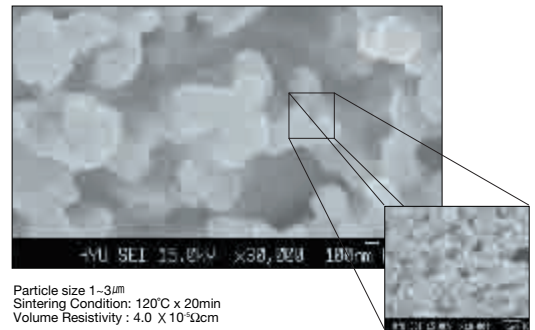
Classification	TEC-PA-010	TEC-PA-020	TEC-PA-030
Ink Type	Hybrid Nano Silver Paste		
Appearance	Dark Green	Dark Green	Brown
Viscosity(cps)	7,000 ~ 7,500	45,000 ~ 47,000	65,000 ~ 70,000
Printing Method	Flat or Rotary Screen	Flat or Rotary Screen	Screen
Density(g/cm ³)	2.20	2.20	2.20
Metal Content(wt.%)	55 ±10	55 ±10	60 ±10

SEM Image of Nano Silver Paste ink Surface

InkTec TEC-PA-010



A company Binder type Paste Ink



TEC-PA series inks have high density after sintering since they have few or no gap between particles. That is why our ink can materialize fine pattern with high conductivity.

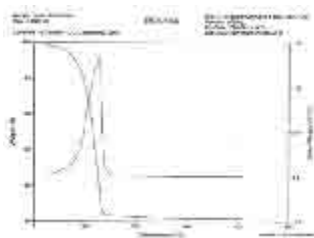
Enhance your competitiveness with advanced technology 'TEC-PA Series' is suitable for the high value-added products which have technical limitations such as low temperature, microelectrode and resistivity. It can improve your competitive edges.

Performance Data

Classification	TEC-PA-010	TEC-PA-020	TEC-PA-030
Curing Temp. (IR & Circulating heat oven)	140°C (5min)	250~300°C (30min)	450~640°C (20min)
Adhesion (ASTM D3359 rating)	PET : Class 5B ~ 4B	PET : Class 5B ~ 4B	Glass : Class 5B ~ 4B
Substrates	PET, PI, PP etc.	PI, Glass etc.	Glass etc.

※ Depending on the type of substrate, a primer treatment is required to improve adhesiveness. InkTec is also providing primer solutions.

TGA Data of TC-PA-010



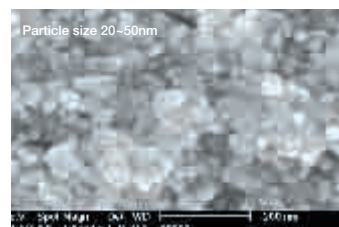
Thickness and Resistivity

Classification	TEC-PA-010	TEC-PA-020	TEC-PA-030
Print Layer Thickness	1~2μm	2~3μm	2~3μm
Sheet Resistivity(mΩ/sq.)	40~50	25	Under 15
Volume Resistivity(Ωcm)	Under 6.0 x 10 ⁻⁶	Under 4.0 x 10 ⁻⁶	Under 6.0 x 10 ⁻⁶

Key Note

1. Fine circuit forming in organic substrates
2. Low temperature plasticity
3. Good conductivity and adhesive capacity compared to the general conductive paste

Exemplary Application

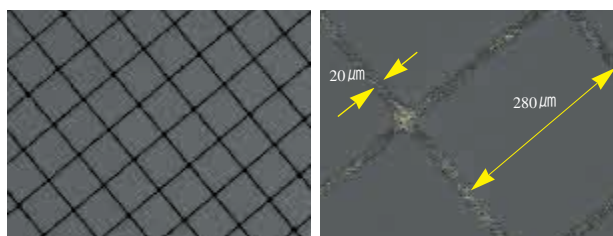


SEM Image of nano particle

PDP Mesh Filter

Test Condition

Classification	TEC-PA-030
Substrate	Glass
Sintering Temp. (Time)	500°C x 15min
Printing Method	Flat Screen Printing
Line Width	20μm
Line Pitch	280μm
Volume Resistivity	2.7 x10 ⁻⁶ Ωcm

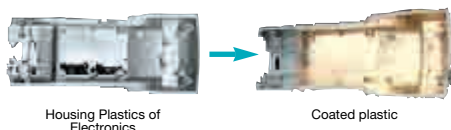


SEM Image of Fine Pattern Printing

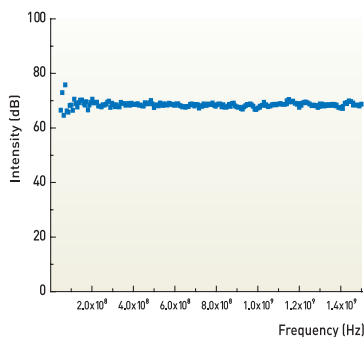
EMI Shielding of Cellular Phone

Test Condition

Classification	InkTec Hybrid Ink
Coating Method	Spray Coating in air
Printing Layer Thickness	1-2μm
Substrate	PC
Conductivity	30~40 mΩ/sq.
Measurement	EM-2107A SE (Range 50MHz~1.3GHz)



EMI Shielding



TEC - CO SERIES(COATING INK) TEC - PR SERIES(PRINTING INK)

InkTec Coating & Printing Ink is a new type metallic ink developed by our original technology. different from the existing plating processing, it does not generate wasted water to be an environment-friendly process, also having faster production speed and easy controllability of viscosity. It can be applied to various coatings of Roll-to-Roll coating, spray coating and dip coating so that it is the next generation ink to be widely applied to cars, home appliances and in architecture.

Product Features



Applicable to Various Coating Methods by Control of Viscosity

It is possible to use various coating method with dip coating, spray coating, roll-to-roll coating, flow coating and spin coating

Short Times for Ink Sintering

It takes short time for sintering so it can improve productivity.

High Reflectivity & Mirror Effect with Thin & uniformed layer

Thanks to brilliant ink formulation technology, you can produce various brilliances with just a few volume of ink since our ink can materialize very thin & uniform layer. It can reduce your raw material cost.

Low Manufacturing Cost

It can reduce your cost in manufacturing reflecting sheets and LCD reflectors by reducing process and time.

Applicable to Various Substrates

Our inks can be applied to various types of substrates, for example Plastic, Aluminum, Magnesium and so on.

Comparison of Coating Process

Classification	InkTec	Others	
	Coating Ink	Plating	Vacuum Plating
Cost	Low cost (Raw material cost & Use of the existing facilities)	Low cost	Cost increase due to the initial facility investment
Production Efficiency	Fast production & Simple process	Not bed	Low production efficiency
Environmental Friendly Production	Environment friendly without generating waste water	Use much water/ Use large amount of toxic substances	Environment friendly
Quality of finished product	Good metallic feel	Various metallic feel but low quality (blot, Inferiority)	Even metallic feel

Ink Properties

Classification	TEC-CO-010 / 020 / 030	TEC-CO-040	TEC-PR-010
Inks	Coating Inks		Printing Inks
Method	Spray / Dipping	Spray / Dipping	Gravure, Flexo, Offset
Application	Plastic coating	Metal coating	Reflective sheet
Viscosity (cps)	1~30	1~30	10~300
Surface Tension (dyne/cm)	30~32	30~32	30~32
Silver Contents (wt.%)	5~10	5~10	5~20

※ To use our coating inks, surface preparation or top coating is required : Regarding the surface preparation or top coating, please consult with our sales person.

Reinforce your competitive power with InkTec mirror coating ink, 'TEC-CO Series'. It is fitted for the high quality of metallic & reflective impact with low cost & fast production. And it is also much more environment-friendly than the conventional coating products.

Performance Data

Classification	TEC-CO-101/020/030	TEC-CO-040	TEC-PR-010
Sintering Temperature	120°C(3~5min)	180°C(10~20min)	120°C(3~5min)
Printing Layer Thickness (nm)	50~200	50~200	50~300
Reflectance (%)	-	-	85~99
Substrates	Plastics	Metals	PET, PI, Paper, etc.

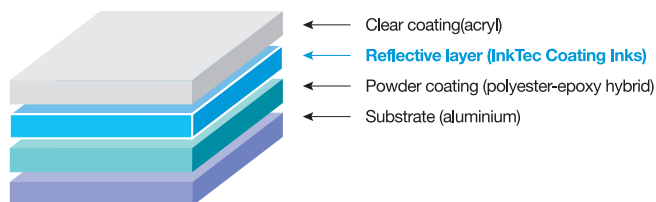
※Printing ink (TEC-PR) can be used not only for brilliance but for the printable electronics such as RFID Tag Antenna.

Exemplary Applications

It can be applied to various coatings of Roll-to-Roll coating, spray coating and dip coating so that it is the next generation ink to be widely applied to cars, home appliances and in architecture.

Silver coated Aluminum wheel

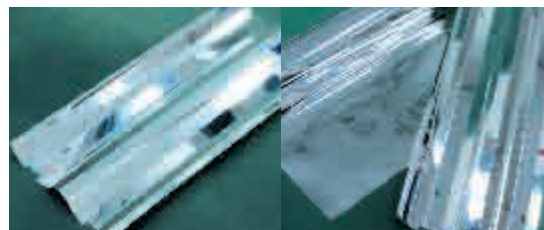
	Process	Temperature	Coating Thickness
1st Layer	Paints(Hybrid, White)	170°C x 20min	100 ~ 120μm
2nd Layer	Silver	175°C x 20min(IR)	0.1 ~ 0.2μm
3rd Layer	Acryl	140°C x 30min	40 ~ 50μm



Application Images



Silver Coated Aluminum Wheel



Reflective Film for Fluorescent Lamp



Plastic Brilliance



Reflective Film for LCD BLU