INKTEC LEADS INNOVATION IN PRINTED ELECTRONIC MATERIALS

InkTec

CONTENTS

EXPERIENCE LEADING-EDGE TECHNOLOGY & INNOVATIVE PRODUCTS

CONDUCTIVE SILVER INKS

· INKJET INK
· SILVER PASTE_ FOR FLAT, ROLL TO ROLL SCREEN PRINTING
· COATING INK_ FOR SPIN, DIP COATING
· PRINTING INK_ FOR FLEXOGRAPHY, GRAVURE PRINTING

PRINTED ELECTRONIC MATERIALS

· COATED PRODUCTS_ SILVER REFLECTIVE FILM, EMI SHIELDING FILM, BLACK INSULATION FILM AND SO ON
· PATTERNED PRODUCTS_ RFID TAG ANTENNA, FPCB, LOOP ANTENNA, BIO SENSOR

INNOVATIVE TECHNOLOGY

InkTec have concentrated our R&D resources on developing state of the art technology in Printed Electronics under the motto of "Today's technology is never good enough for us". As a result of these efforts, InkTec invented transparent silver nano ink and commercially introduced TEC ink under the InkTec's creative technology which is employed in activation of capping agent and making ag cluster complex strengthening the competitiveness of high-efficient conductive power, adhesive power, surface roughness.

WIDE RANGE OF SELECTION AS CUSTOMER'S NEEDS

InkTec is supplying the printed electronic materials such as inkjet, hybrid silver paste, coating and printing inks which can be easily applied to the various types of printing process from laboratory instrument to mass production line. Furthermore, we will expand our product line such as ceramic, molecular inks and applications in printable electronic & display field. With these efforts, we are trying to meet customer's requirement.

STABLE BUSINESS BASED ON TRUSTY-WORTHY IPR (INTELLECTUAL PROPERTY RIGHTS)

After jumping into business area of Printed Electronics, InkTec has achieved a lot of technological accomplishments. Not only gaining a profit but also developing printed electronics market, we have obtained many intellectual properties both material-wise patents and processing-wise patents. This will help our customers to maintain their long-term and stable business.

MOST COMPETITIVE CUSTOMIZING ABILITIES

InkTec provides total solution including optimized materials and manufacturing process to our customers based on our accumulated core technology and know-how in manufacturing process.
As a core-technology, InkTec can control the amount of silver contents, the size of silver particles and viscosity of our silver inks. Also we can offer streamlined and customized manufacturing method in accordance with customer's request or need. As a consequence, we can add more values to our customers with a wide range of choices and make easier to hit the bull's-eye on our customer's end.

INKTEC LEADS NEW PARADIGM IN PRINTED ELECTRONIC MATERIALS

InkTec provides a wide range of products such as conductive inks and printed electronic materials.
InkTec can offer customized inks and printed applications for Customer's requirement using our superb formulation technology and the cutting edge printing facilities.

LOCATION & FACILITY

ANSAN Ist PLANT

Headquarters
· Production facility & RD (UV Printer) of PS (Printing System)
· Production facility of Patterned application

ANSAN 2nd PLANT

Intelligent Building Management System
R&D, Production Facilities
· Ink manufacturing facilities (Reactor, Mill etc.)
· Production Line for ink injection, suction and sealing
· Test Equipment (Weather-O-Meter, HPLC, GC, FTIR, NMR and XRF, etc.)
· Special coating line

PYUNGTAEK PLANT

Intelligent Building Management System
· ISO 9001 & 14001 compliant facilities and processing
· All Printing Facilities in clean room (Class 1,000~10,000)
· Ink Production, Printing Facilities (3 lines) and QM.
· Direct Gravure, Micro Gravure, Rotary Screen
with inline inspection and alignment equipment
· Laminating and Slitting Facilities

HISTORY

1992 Established InkTec Co., Ltd
1993 Certified of the KT (Korean Technology) Mark
1996 Received the IR52 Jang Young Shil Award (Minister of MOST Prize)
1998 Awarded the Export Achievement Trophy for US$ 1million

2000 Expanded and relocated the headquarters and plant (Ansan, Gyeonggido)
Awarded the Export Achievement Trophy for US $5 million by KITA
Certified of ISO 9001 by Korea Management Association
2001 Awarded the Export Achievement Trophy for US $10 million by KITA
2002 Company Registered in KOSDAQ on Feb. 28, 2002
Achieved New Technology (NT) Mark for Solvent-based Inks for Inkjet Printer
2003 Certified for CE
Certified for ISO 14001 Environmental Management System
2004 Designated as Advanced Technology Center by MOCIE
(Electronic materials in inkjet applications Designated as Advanced R&D Cluster by KOITA)

2005 Unveiled 'Transparent electronic Ink', an advanced electronic new material
Selected for 'Parts and materials technology development project' by the Ministry of Industry, Commerce and Energy
Constructed Pyeongtaek Plant (Poseung, Gyeonggido)
2006 Completed Pyeongtaek Pant
2007 Constructed new production lines for the electronic materials (Poseung,Gyeonggido)
Certified for NET(New Excellent Technology) by the minister of science and technology
2008 Received the IR52 Jang Young Shil Award and the best Jang Young Shil Award by Prime Minister
Awarded the Export Achievement Trophy for US $20 million by KITA
2009 Certified for PEEA 2009(Printed Electronics Europe Award 2009) by the IDTechEX
Certified 'NET (New Excellent Technology for Ag Reflective Film)' by Ministry of Science and Technology
Won the 'King Sejong Patented Technology Prize' by the Korean Intellectual Property Office

2010 Certified for Green Technology by Ministry of Education Science and Technology
2011 Awarded the Export Achievement Trophy for US $30 million by KITA
2012 Jetrix 2513 awarded Best Specialist Printer by European Digital Press Association
2013 InkTec designaged as World class 300 company
Awarded the Export Achievement Trophy for US $50 million by KITA
2014 Relocated and expanded the headquarters (98-2 Neungan-Ro, Ansan)


Certification for Nano Industry Technology (MOCIE)


Certification for New Technology (MOST)


The best Jang Young Shil Award

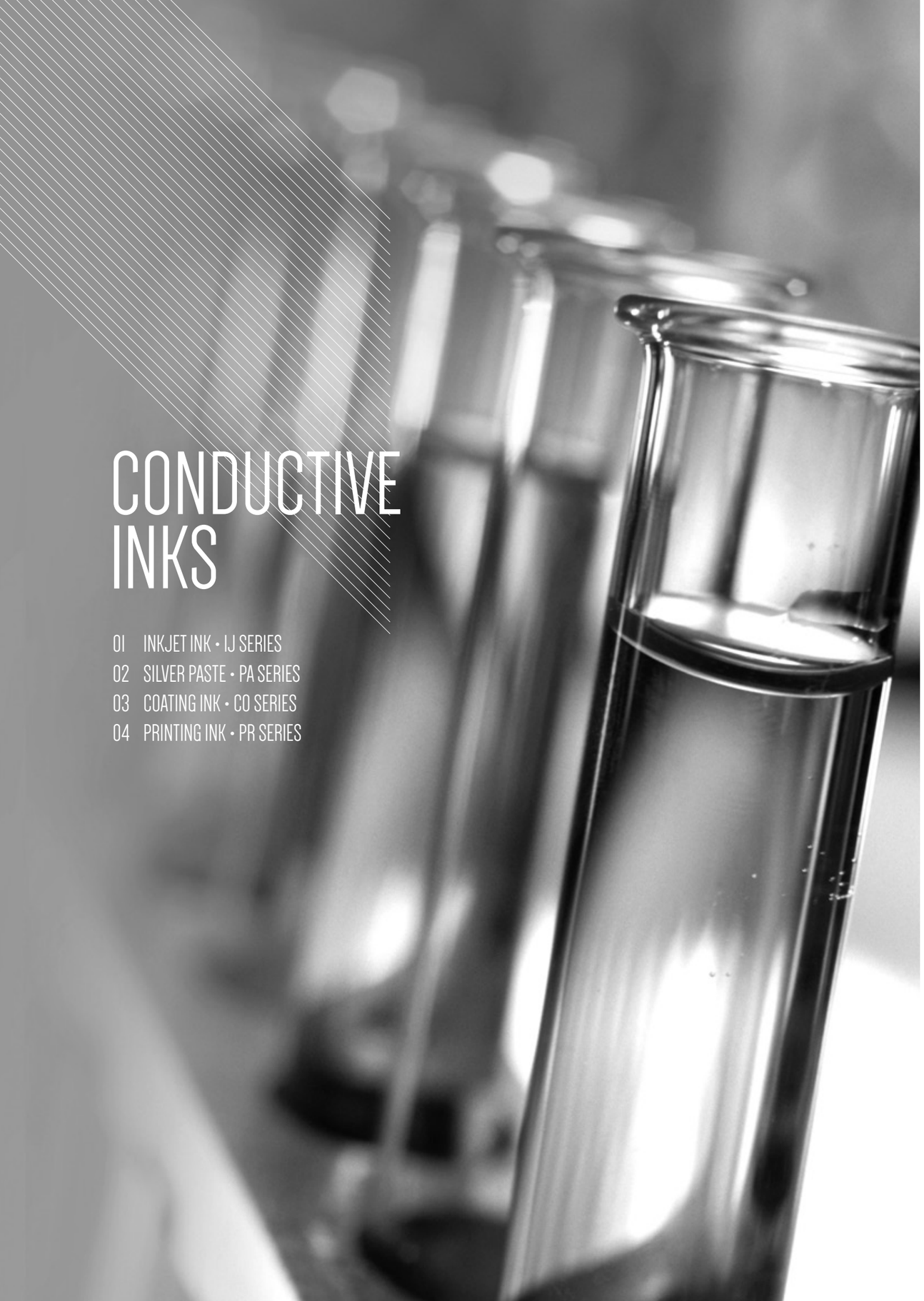

PEE Awards from IDTechEx


Award for the large export achievement

Certification for ISO 9001/ 14001

Certification for ATC (Advanced Technology Center)


Decoration for the Order of Industrial Service Merit



CONDUCTIVE INKS

01 INKJET INK • IJ SERIES
02 SILVER PASTE • PA SERIES
03 COATING INK • CO SERIES
04 PRINTING INK • PR SERIES

CONDUCTIVE INK MANUFACTURER, INKTEC

Based on our deep experience and high reputation as an ink manufacturer in IP (Image Printing) market, InkTec proudly introduces our TEC (Transparent Conductive Electronic) Inks which are distinctively formulated compared with conventional conductive inks in the previous marketplace.

DISTINGUISHED TECHNOLOGY OF INKTEC, TEC INK

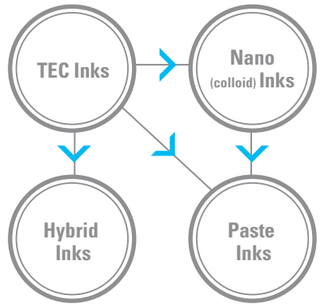
TEC is different from other conventional conductive inks based on nano-technology, InkTec ink is formulated by soluble silver cluster & complex structure. The ink is transparent before curing because silver is solved with a nano-particle size in solvent. But it is metalized in a high density and uniformed surface with superior conductivity after curing

TEC inks make up for the weak points of other nano particle inks in a certain point of view such as stability, thickness, low temperature curing. And InkTec offers customized ink for various customer's printing method such as inkjet, screen, offset, flexography and gravure by customizing abilities in viscosity and formulation of inks.

Appearance of TEC ink

Printing (before Curing)

After Curing



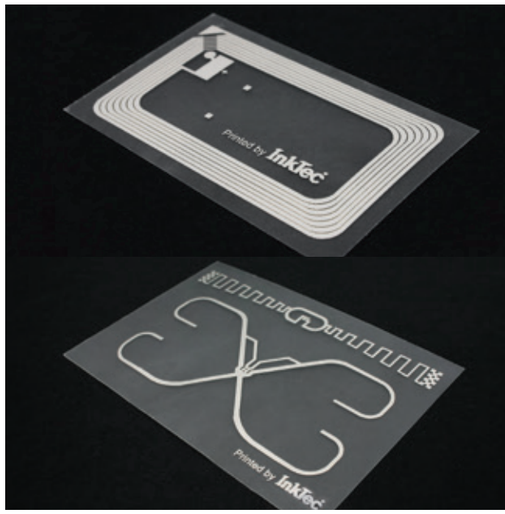
Good conductive through forming thin layer
Reduction of raw material

Available for Various Printing Methods
Inkjet, Flexography, Off-set, Screen, Gravure, etc.

INKJET INK

Differently from other prior conductive inks based on
nano-technology in the marketplace.
InkTec's Inkjet ink is not formulated by particle structure
so it is stable even in a room temperature
and optimized in printing fine patterns.

IJ SERIES



APPLICATIONS

OTFT, Memory Cell, Display, RFID and so on

PRODUCT FEATURES

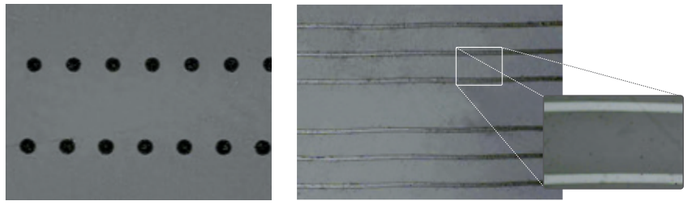
· Sub-nano particle size
· Jetting stability & Compatibility with various kinds of print heads
· Short Curing Time in a Low-temperature
· Optimization in Fine Pattern & Thin Layer

INK PROPERTIES

Classification	TEC-IJ-010	TEC-IJ-060 *
Particle Size	None particle based ink	None particle based ink
Curing Temp (IR & Circulating heat oven)	130-150 (5-10min)	130-150 (5-10min)
Layer Thickness (After curing)	323nm (210dpi)	341nm (1350dpi)
Volume Resistivity (Ωcm)	4.2×10^{-6}	8.35×10^{-6}

The above information is based on the test result in our lab.
The result can be changed according to your printing method or test environment. (Bulk Silver resistivity : 1.6×10^{-6}Ωcm)
* Compatible with ITO coated substrates

TEC-IJ-010 (for Dimatix 1pl Cartridge) Printed Image

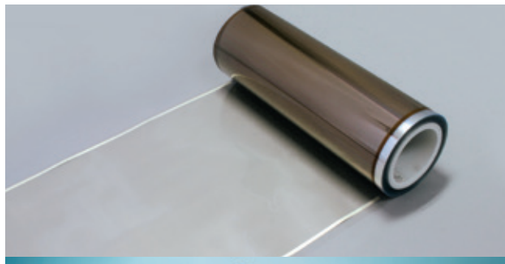


Element ID : 3
Element Type : M4 - Circle CR
Element Label :

Feature	Actual
X_Crd	2.9098
Y_Crd	-0.0395
D	0.0325
R	0.0163
Circular	0.0000

SILVER PASTE

InkTec paste inks can be used for vulnerable substrates to high temperature (Paper, PET and so on) as well because it is possible to be metalized in low temperature within a short time after printing. TEC-PA series has a high density after curing because it has few or no gab between particles. That is why our ink can materialize fine pattern with high conductivity.



PA SERIES

APPLICATIONS

Touch Panel, Solar Cell, Display, EMI Shielding, RFID and so on

PRODUCT FEATURES

· Optimization in Fine Pattern & Thin Layer

· Short Curing Time in a Low-temperature

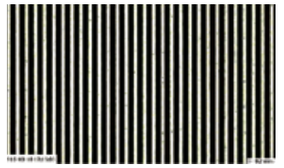
INK PROPERTIES (FOR SEREEN PRINTING)

Classification	Patterning Method	Curing Temp. (Convection oven)	Layer Thickness (After curing)	Volume Resistanceon ITO (Ωcm)	Remark
TEC-PL-010	Screen	100°C (30min)	6-8 ㎛	Max 6.5×10^{-5}	low curing temp.
TEC-PA-010 *	Screen	100 ~ 130°C (2~5min)	1-2 ㎛	Max 6.0×10^{-6}	Binder free
TEC-PA-051 LV	Screen	130°C (20min)	6-8 ㎛	Max 6.5×10^{-5}	-
TEC-PA-051	Screen	130°C (20min)	6-8 ㎛	Max 6.5×10^{-5}	-
TEC-PA-060	Screen + Laser	130°C (20min)	5-6 ㎛	Max 6.5×10^{-5}	-
TEC-PA-061T	Screen + Laser	130°C (20min)	4-5 ㎛	Max 6.5×10^{-5}	-
TEC-PA-070	Screen	130°C (20min)	-	Max 3.0×10^{-4}	Hybrid Ink
TEC-PA-080	Screen + Laser	130°C (20min)	3-4 ㎛	-	Ultra fine pattern
TEC-PS-C10	Screen	130°C (20min)	-	Max 6.5×10^{-5}	For car display
TEC-IM-C10	Imprinting	110°C (20min)	-	9.0×10^{-5}	For metal mesh

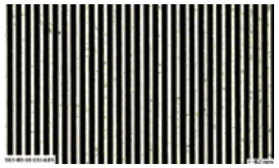
* Depending on substrates, it might be needed a primer treatment to improve adhesion

LASER PATTERN : MICROSCOPE IMAGE (DARK FIELD MODE)

*** TEC-PA-060 (L/S=30㎛/30㎛)**



*** TEC-PA-061T (L/S=30㎛/30㎛)**



COATING INK

InkTec Coating Ink is the new type of metallic ink developed by our original technology.
Our product is environment-friendly because of no waste water like a conventional plating process and also has high productivity with a fast production speed and easy controllability of the viscosity.
That's why our product can be applied to various coatings method such as roll to roll coating, spray coating and dip coating.

CO SERIES

APPLICATIONS

Decoration for mobile phone case, automobile, home appliances and architecture industry and so on.

PRODUCT FEATURES

· Applicable to various substrate – plastic, Al, Mg and so on
· High reflectance & mirror effect with thin & uniformed layer
· Low manufacturing cost and Environment-friendly production process

INK PROPERTIES

Item	TEC-CO-011	TEC-CO-021
Printing Method	Spray/Dipping	Spray/Dipping
Curing Temp.	120°C (3-5min)	80~120°C (3-5min)
Layer Thickness (After curing)	100 - 150nm	100 - 150nm

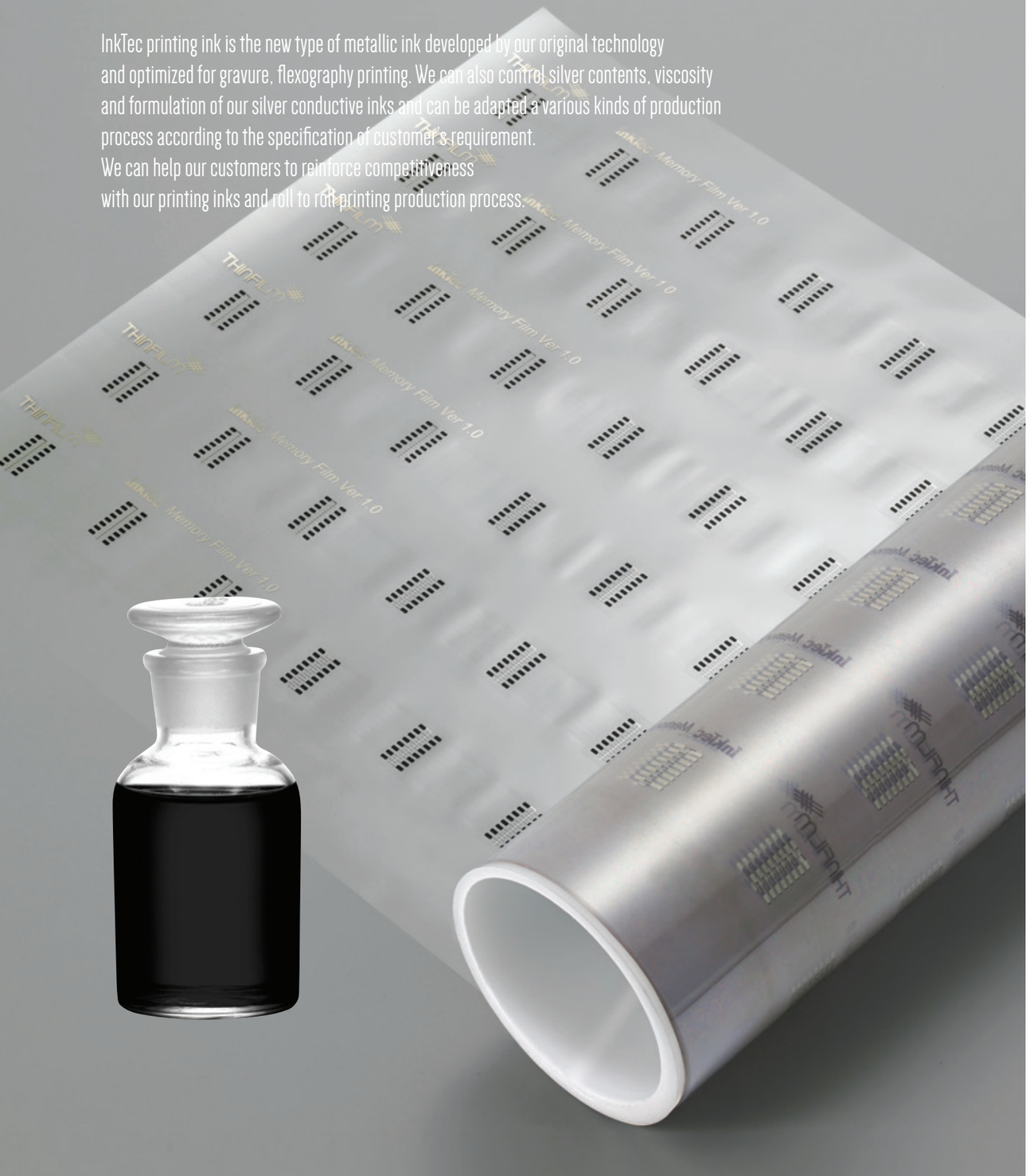
To use our coating inks, surface treatment or top coatings is required

COMPARISON OF COATING PROCESS

Classification	InkTec Coating Ink	Plating	Vacuum Plating
Cost	Low cost (Low material cost & use of the existing facilities)	Low cost	Cost increase due to the initial facility
Production Efficiency	Easy production & simple process	Not bad	Low production Efficiency
Environmenta Pollution	Environmental friendly without wasted water	Use of much of wasted water/ Use of mass amount of toxic substances	Environment-friendly
Quality of finished product	Good metallic feel	Various Metallic feel but low quality (Blot, Inferiority)	Even metallic feel

PRINTING INK

InkTec printing ink is the new type of metallic ink developed by our original technology and optimized for gravure, flexography printing. We can also control silver contents, viscosity and formulation of our silver conductive inks and can be adapted a various kinds of production process according to the specification of customer's requirement.
We can help our customers to reinforce competitiveness with our printing inks and roll to roll printing production process.



PR SERIES

APPLICATIONS

Flexible electronic materials such as memory, display electrode and functional films and so on.

PRODUCT FEATURES

- Thin layer with high conductivity
- High productivity by wide and fast roll to roll printing
- Optimized inks for Flexible substrate

INK PROPERTIES

Classification	TEC-PR-010	TEC-PR-041
Printing method	Gravure, Flexography	Gravure, Flexography
Curing Temp	120℃~170℃(2-5min)	130℃ (20min)
Layer Thickness (After curing)	1㎛	1㎛
Viscosity (Brookfield LV DV-II+ PCP@1rpm)	< 100cPs	< 400cPs
Adhesion (on PET film, ASTM D 3359 rating)	4~5B	4~5B
Volume Resistivity (Ωcm)	5×10^{-6}	10×10^{-6}

The above information is based on the test result in our lab.
The result can be changed according to your printing method or test environment.
(Bulk Silver resistivity : 1.6 X 10^{-6}Ωcm)

PRINTED PRODUCTS

01 SILVER REFLECTIVE FILM
02 EMI SHIELDING FILM
03 BLACK INSULATION FILM
04 FLEXIBLE ELECTRODE • FPCB

1ST. MOVER IN PRINTED ELECTRONIC MATERIALS, INKTEC

InkTec provides the fitted printed electronic products for customer's products using our superior printing facilities and our own electronic inks.

FACILITIES

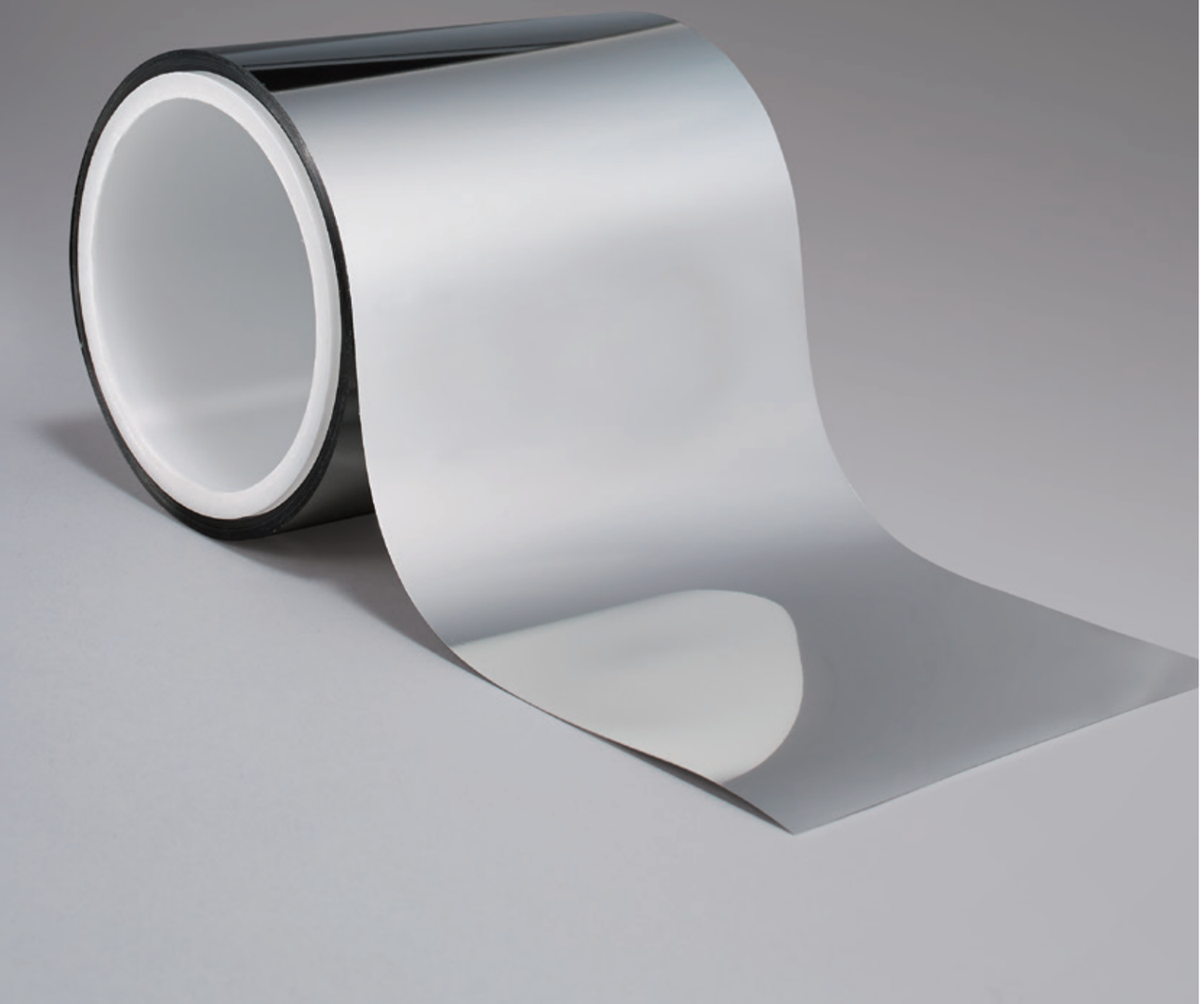
Our production line is optimized for mass production in faster time. For maximizing customer satisfaction, we adopted various roll to roll printing facilities & intelligent and eco-friendly system. On top of these equipments, we do have our own manufactured superb inks; therefore, InkTec can meet customer's order in shorter lead time with much better quality among competitors in Printable Electronic industry.

CAPACITY

Spec	Line 1	Line 2	Line 3
Max width of printing(mm)	~ 350	~ 1600	~ 1600
Annual production capacity(m^2/yr)	~ 1,800,000	~ 10,000,000	~ 10,000,000
Available printing	Direct Gravure Micro Gravure Rotary Screen S-knife/Comma Flexography	Micro Gravure S-knife/Comma	Direct Gravure Micro Gravure Rotary Screen

SILVER REFLECTIVE FILM

Using InkTec's own 'Transparent Silver Ink' and superior Roll to Roll printing production line,
InkTec provides the silver reflective film having a high reflectance.



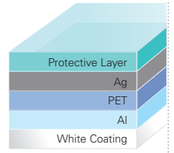
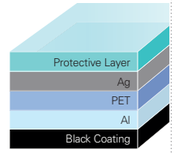
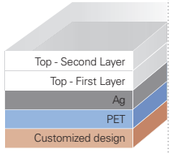
APPLICATIONS

Cellular phone, Tablet PC, LCD TV, LCD Monitor, Notebook,
MP3 Player, Digital camera , Navigation, LED lighting, etc.

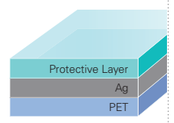
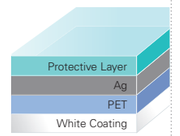
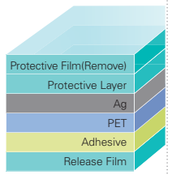
PRODUCT FEATURES

· High Reflectance
It materializes high reflectance of the dense and uniformed surface of the reflective film.
· High Grade Properties
Due to a top clear protective layer, it can not only minimizing the diffused reflection, pollution level and yellow stain, but reinforcing properties of anti-scratch, moisture proof and corrosion proof.
· Very Short Lead Time
We can provide our products in very short lead time because we churn out our novel silver reflective film using the high speed roll to roll printing process. We print reflective film by our own printing line with transparent silver ink developed and produced by ourselves.

SILVER REFLECTIVE FILM FOR LCD BLU

Model	LRF-00-HE050 series LRF-00-HE070 series	LRF-00-HB070 series	Reflective Film for High Brightness	Measurement Method
Structure				-
Reflectance (%) (380nm ~780nm)	Over 97%	Over 97%	Over 98%	* According to the KSA0066 standards * Lambda-650s UV/VIS spectrometer / Perkin Elmer
Thickness (㎛)	60±6, 70±7	70±7	About 75	Micro Meter
Reliability	Qualified	Qualified	Qualified	Thermal Shock Heat resistance Humidity Resistance

SILVER REFLECTIVE FILM FOR LED LIGHTING

Model	FRF-00- HA038	FRF-00- HA200	FRF-00-HP050	Measurement Method
Structure				-
Reflectance (%) (380nm ~780nm)	Over 96%	Over 96%	Over 97%	* According to the KSA0066 standards * Lambda-650s UV/VIS spectrometer / Perkin Elmer
Thickness (㎛)	52±5	210±20	205±20, 193±20	Micro Meter
Reliability	Qualified	Qualified	Qualified	Thermal Shock Heat resistance Humidity Resistance

EMI SHIELDING FILM

EMI or Electro Magnetic Interference Shielding Film consists of high conductive metal layer with insulation layer and high conductive adhesive layer. Currently, FPCs are being widely used in Cellular phone, Tablet PC, Laptop computer, LCD, OLED, PDP and the other electronic equipment for wiring because of characteristics of its high bendability, high density catching up with mainstream of IT device shown in a "more lighter, thinner, shorter, smaller" Especially, FPCs is in the center of these trend and require high performance of EMI shielding; therefore, InkTec developed EMI shielding Film with a high flexibility and high performance of shielding to satisfy customer's needs.

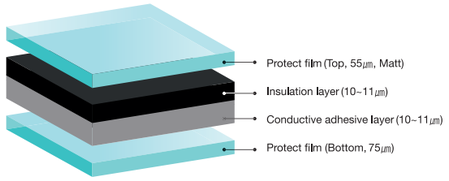
APPLICATIONS

Cellular phone, Tablet PC, Laptop computer,
MP3 Player, Digital camera, PDA, Navigation, etc.

PRODUCT FEATURES

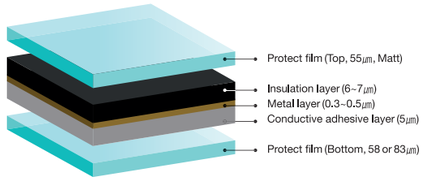
· Easiness of pre-treament & after-treatment in a low temp.
· High Shielding Effect
· High Chemical Resistivity
· Excellent Heat Endurance (Solder)
· High Peel Strength (Bonding sheet)

ICA Type



· **Insulation**
Excellent Heat & Chemical Resistance
· **Conductive Adhesive**
Excellent Shield Effect & Conductivity
· **Flexibility**
Good Flexibility(Slide & MIT)
· **Superior Reliability**
High temperature & humidity-resisting /
Salt water-resisting/ Cold-heat shock resisting

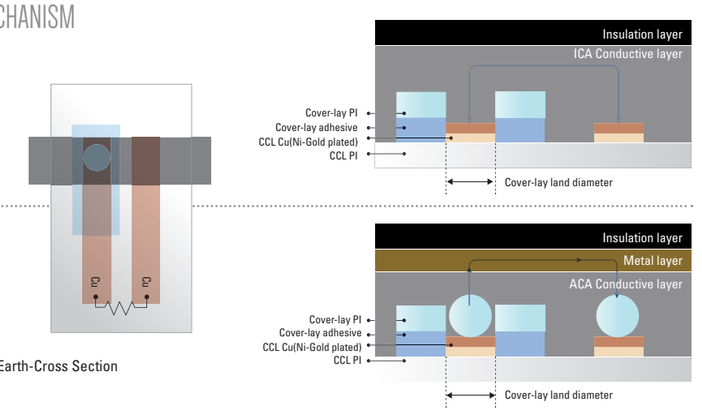
ACA Type



· **Good adhesion function between layers**
· **Superior Reliability**
High temperature & humidity-resisting /
Salt water-resisting/ Cold-heat shock resisting
· **Good compatibility with insulation material**
Chemical-resisting/ Solder heat-resisting
· **Metal layer Flexibility**
Slide flexibility/ MIT flexibility
· **Thin EMI Shielding Film**

EMI SHIELDING MECHANISM

ICA Type



ACA Type

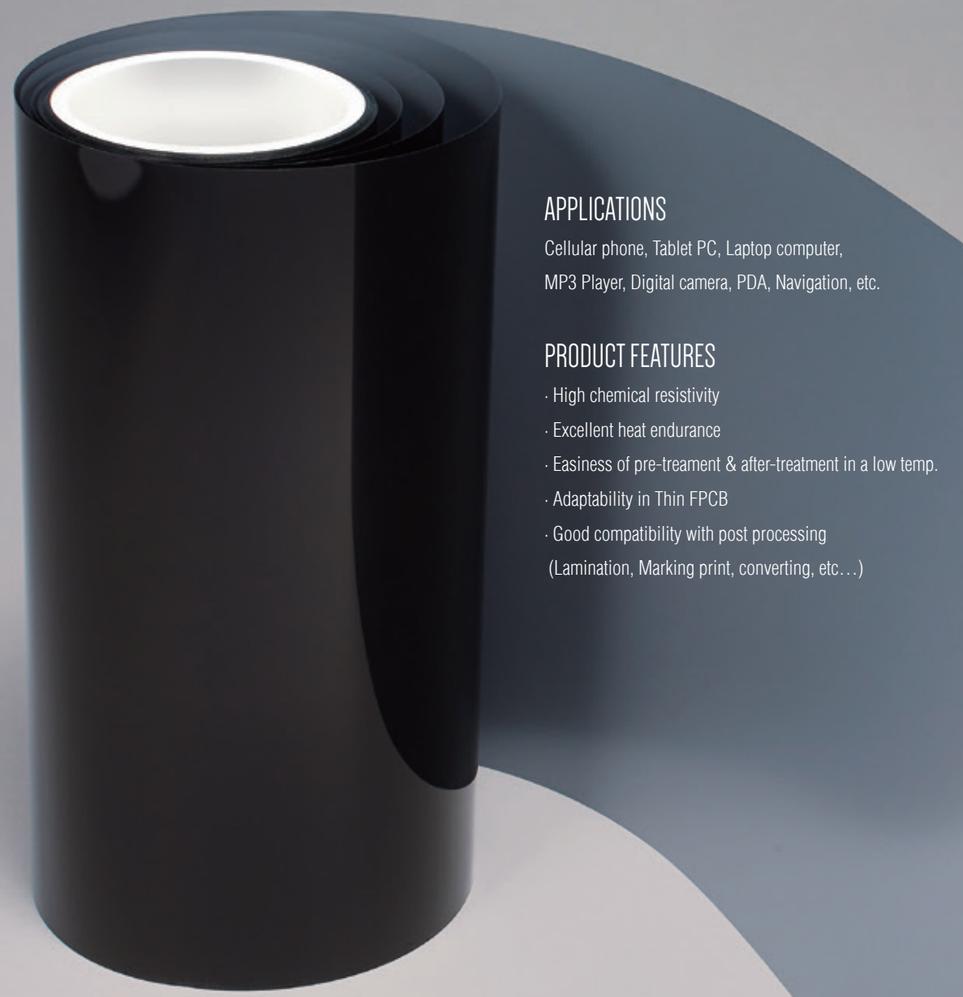
* Type EMI-GND Earth-Cross Section

ICA TYPE vs ACA TYPE COMPARISON

Model	ICA Type	ACA Type
Advantage	· Good Heat & Chemical Resistance · High shielding effect · Good conductivity for ground size · Good Reliability · Easy to strip the Protect film · High efficiency in pre-fixing	· Good Heat & Chemical Resistance · Good Flexibility · More Thinner type · Flex Conductivity · Good Reliability · Easy to strip the Protect film · High efficiency in pre-fixing
Thickness(After Press)	18㎛~20㎛	10㎛~14㎛
Step Conductivity	Excellent	Good
Conductivity for Ground size	Excellent	Good
Shield effect	> 55 dB	> 50 dB
Conductivity [3cm, 2mmΦ, after baking]	< 0.4 Ω	< 0.7 Ω
Pre-Treatment	· Pre-Fixing : ◎ · Strip the Protect Film : ○	· Pre-Fixing : ○ · Strip the Protect Film : ○

BLACK INSULATION FILM

Black Insulation Film with high performance consists of double layers:
one is insulation layer and the other is the adhesive layer without PI film.
Currently, the demand of black cover-lay in FPCs' market is increasing
for preventing 'Reverse Engineering'. InkTec black insulation film is developed
to replace the conventional black cover-lay of high performance with thinnest layer,
high flexibility to satisfy customer's needs.



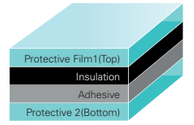
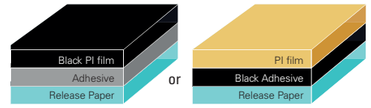
APPLICATIONS

Cellular phone, Tablet PC, Laptop computer,
MP3 Player, Digital camera, PDA, Navigation, etc.

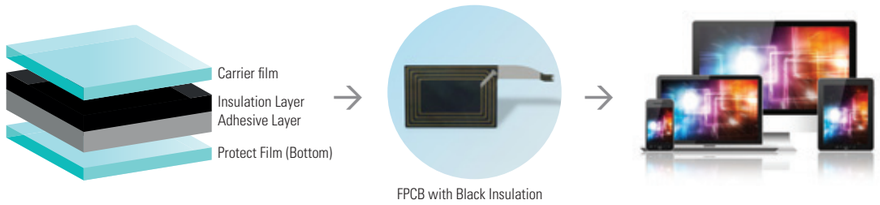
PRODUCT FEATURES

· High chemical resistivity
· Excellent heat endurance
· Easiness of pre-treament & after-treatment in a low temp.
· Adaptability in Thin FPCB
· Good compatibility with post processing
(Lamination, Marking print, converting, etc…)

COMPARISON OF COATING PROCESS

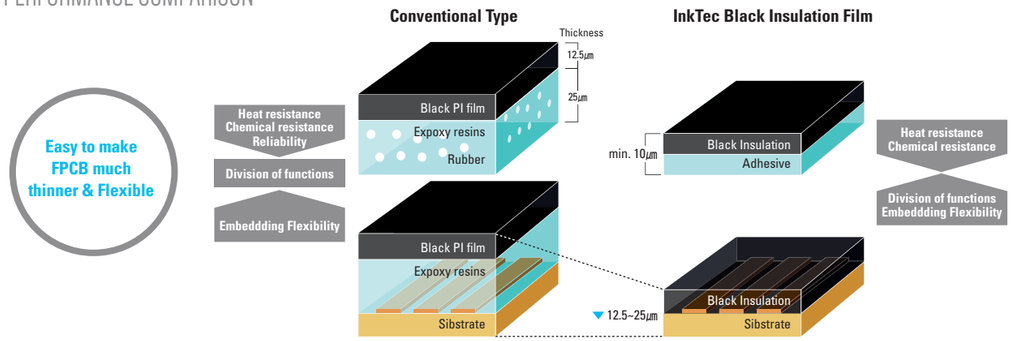
Product		Black Insulation Film	Conventional Type
Structure			
Spec.	Protect Film (Top)	Matt (Release PET) 50~100㎛	X
	Insulation	Black color, min 5㎛	PI film, 12.5, 25㎛
	Adhesive	Adhesive, min 5㎛	Modified Epoxy Resin based, 15~40㎛
	Protect Film (Bottom)	Carrier PET, 50~150㎛	Resin coated paper, 115㎛

APPLICATION PROCESS



FPCB with Black Insulation

PERFORMANCE COMPARISON

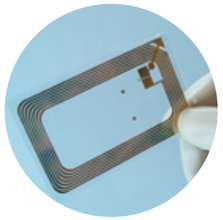
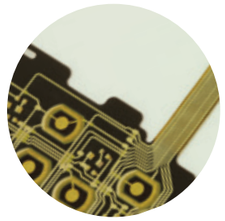
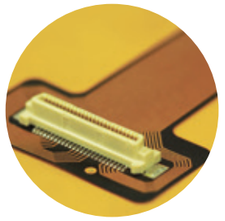


PROPERTIES

Properties			Unit	BT-Series	Test Method
Thickness	Insulation Layer & Adhesive Layer			Min Type : 10 Max Type : 25	Micrometer According to market needs, it can be adjusted to its thickness within the range
	Protect Layer	Carrier	㎛	50~100	Micrometer
		Protect	㎛	50~150	Micrometer
Solder Floating			Pass/ NG	Pass	Lead soldering by dipping method(288ºC, 10sec)
Chemical Resistance			De-lamination	Pass	NaOH 5%, 50ºC, 10min dipping HCl 5%, 50ºC, 10min dipping Zestron FA+, 50ºC, 10min dipping

FLEXIBLE ELECTRODE FPCB

InkTec provides the competitive printed electronic products such as FPCB
with our own conductive ink and superior Roll-to-Roll printing line.
We are continuously expanding the printed applications through intensive R&D Investment
and effort toward performance improvement.

InkTec can provide customized products according to customer's drawing and requirements.

APPLICATIONS

Type	Applications
Ag Direct	DMB Antenna, Electrode for LED, Functional Sensor Board Etc.,
Ag+Cu & Hybrid CCL	Antenna (RF, NFC, Intenna, Main/Wi-Fi Etc.,), Key PBA, Suspension, FPC Module Connector, Cable, Functional Sensor Board, Coil Sensor Etc.

PRODUCTION TYPE

Type	Substrate	Method	Min Pitch	Structure
Ag Direct	Plastic Film (PET, PI etc.)	Printing	L/S : 50/50㎛	Single, Double & Multi Layer
Ag+Cu	Plastic Film (PI)	Printing + Plating	L/S : 80/80㎛	
Hybrid CCL	Plastic Film (PI)	Coating(Printing) + Plating + Etching	L/S : 30/40㎛	

FACILITIES

	Facilities	Type	Width	Remark
Printing	Screen	R2R, Sheet	~750mm	
	Flexography	R2R	~350mm	
Coating	Gravure	R2R	~1,200mm	Coating & Slitting
Plating	Electro Plating	R2R	~500mm	
DES	-	-	~500mm	LDI, Etching, Strip, D/F Laminator
etc	-	-	-	BBT, AOI, Puncher / Measuring & Inspection facilities etc.

EXPERIENCE LEADING-EDGE
TECHNOLOGY & INNOVATIVE PRODUCTS,
INKTEC




InkTec Co., Ltd.
98-12, Neungan-ro, Danwon-gu, Ansan-si, Gyeonggi-do, 425-839, Korea
Tel 031 490 6288 **Fax** 031 490 2041 **E-mail** ei@inktec.com www.inktec.com

MEC-PE01A 150614 V3.0